A Q U A P H Y T E

Center for Aquatic Plants
with support from
The Florida Department of Environmental Protection,
Bureau of Aquatic Plant Management
The U.S. Army Corps of Engineers,
Waterways Experiment Station,
Aquatic Plant Control Research Program

UNIVERSITY OF FLORIDA
Institute of Food and Agricultural Sciences

Volume 16 Number 1 Spring 1996 **Gainesville, Florida** **ISSN 0893-7702**

APIRS Web Site A Hit!

When planning computer systems and usage, cyber wisemen say to "push the envelope": plan to use the newest technology, anticipate its maximum usage, then double your requirements before buying. This way, your computer system will be state-of-the-art and may possibly operate at maximum efficiency for at least 6 months.

We at APIRS attempted to follow this advice last year when designing our new computer system and Internet Web site. Our anticipated usage of this site was relatively low: after all, how many people would want to gaze at aquatic plant photos and line drawings in a day? Maybe as many as 50 Web browsers a day?

Well, the results are in for the first four full months of usage of the APIRS site, December 1995 through March 1996. The answer is that in December, our site was visited an average of 25 times per day; by March, the average number of visits had increased to 80 times per day, not including University of Florida visitors. **This is almost 2,500 times per month and climbing.**

We appreciate your interest in our Web site and thank you for your comments and suggestions: **http://aquat1.ifas.ufl.edu/**

[See Accessing the Aquatic Plant Database on Page 2]

Army Corps Aquatic Plant Program Under New Leadership

Mr. Lewis Decell, Program Manager of the US Army Corps Aquatic Plant Control Research Program (APCRP) retired at the end of 1995 after many years with the program he helped create. Under his leadership, APCRP established research work units for biological control, chemical control, and ecology of aquatic plants. He also created the Corps' new Center for Aquatic Plant Research and Technology in 1993 to provide a single facility to coordinate aquatic plant research and technology transfer.

Dr. John W. Barko is the new Program Manager of APCRP, taking over from Decell on January 1, 1996. Barko for years has been an aquatic plant ecology researcher, and previously served as the technology area leader for ecology under APCRP.

Among the first decisions Barko will make is how to re-focus the programs of APCRP, necessary after last year's federal budget cuts resulted in a 50% reduction in research money for the aquatic plant program this fiscal year. One silver lining to Barko's budget dilemma is that as of this writing, the President's budget proposal for 1997 does not further cut the APCRP budget.

Another silver lining is that Mr. Robert Gunkel continues to serve as the assistant manager of the program: Gunkel was instrumental in educating Congress as to the need for aquatic plant research and the need for funding at the federal level, thus saving APCRP from an otherwise certain demise.

Barko and Gunkel may be contacted at US Army Corps of Engineers, Waterways Experiment Station - EP, 3909 Halls Ferry Road, Vicksburg, MS 39180-6199, (800) 522-6937, ext. 3654, or (601) 634-3654.

Online Book - Nonindigenous Species of Florida

A timely and useful new book about nonindigenous species in Florida, three years in the making, is now available for viewing and downloading *ONLY* at the APIRS Web site. This 300+ page review of the scientific literature was initiated by the Aquatic Nuisance Species Task Force authorized under the federal Nonindigenous Species Prevention and Control Act of 1990.

The book, *Nonindigenous Aquatic and Selected Terrestrial Species of Florida*, by J.A. McCann, L.N. Arkin and J.D. Williams (National Biological Service, Gainesville, Florida), presents the status, pathway and time of introduction, present distribution, and significant ecological and economic effects of 154 introduced species of plants, mollusks, insects, fish, amphibians, reptiles, birds, mammals and crabs.

How did this worthy work, produced by a federal agency, come to be first "published" on a state agency Internet site? It's the economy, stupid! As a cost-saving measure, the NBS shut down its national publication and information unit in Colorado. Luckily, the University of Florida Aquatic Plant Information Office is still in business, and we were happy to suggest this most hi-tech way of paperless publishing. Our guess is that the book will gain wider distribution via the Internet than if 20 photocopies were produced and "made available" through traditional channels.

See the book at our web site:

http://aquat1.ifas.ufl.edu/

Accessing the Aquatic Plant Database

During March, 1996, almost 200 individuals from 23 countries gained access to and used the APIRS aquatic plant database through our Web site. The database now includes more than 42,000 citations. Use of the database, whether through our Web site or by contacting the APIRS office, is free of charge to anyone.

We have received many compliments and suggestions from successful Web users, and are grateful for them. Now we are certain that remote use of our database is a valuable service to those who are able to access and use it.

From our e-mail and telephone calls, though, we know also that many of you have tried but failed to get into the database, or to make it work properly, through our Web site. Here are a few answers:

You Get to the Database Through Telnet

To use the database, your computer must have a "telnet application" (such as QVTNET), **in addition to** your Web browsing software (such as Netscape). **When properly configured,** your browser will automatically start the telnet application when you click on "Telnet" on our Web site database page. Your computer will then present a text only window with the word (or prompt) "login:". Now you type "guest" as the password and follow the log on instructions as provided on our Web site database page.

Many users have no difficulty accessing the Web site, but when they go to the database page, and click on "Telnet" to get to the aquatic plant database, the message "unable to find application" appears. In short, Web users who get such a message have a problem at their end, and need to contact their local computer guru for help in further setting up their Web browsing and telnet capabilities.

The Database Interface Can Be Confusing

Because of financial considerations, the APIRS Web/Database interface is plain, old-fashioned, and user-noncomplaisant. The database "search" and "display" screens are obviously unlike the rest of the Web site, and are somewhat confusing as a consequence. About twenty thousand dollars, the cost of interface software compatible with our system, should fix the problem nicely.

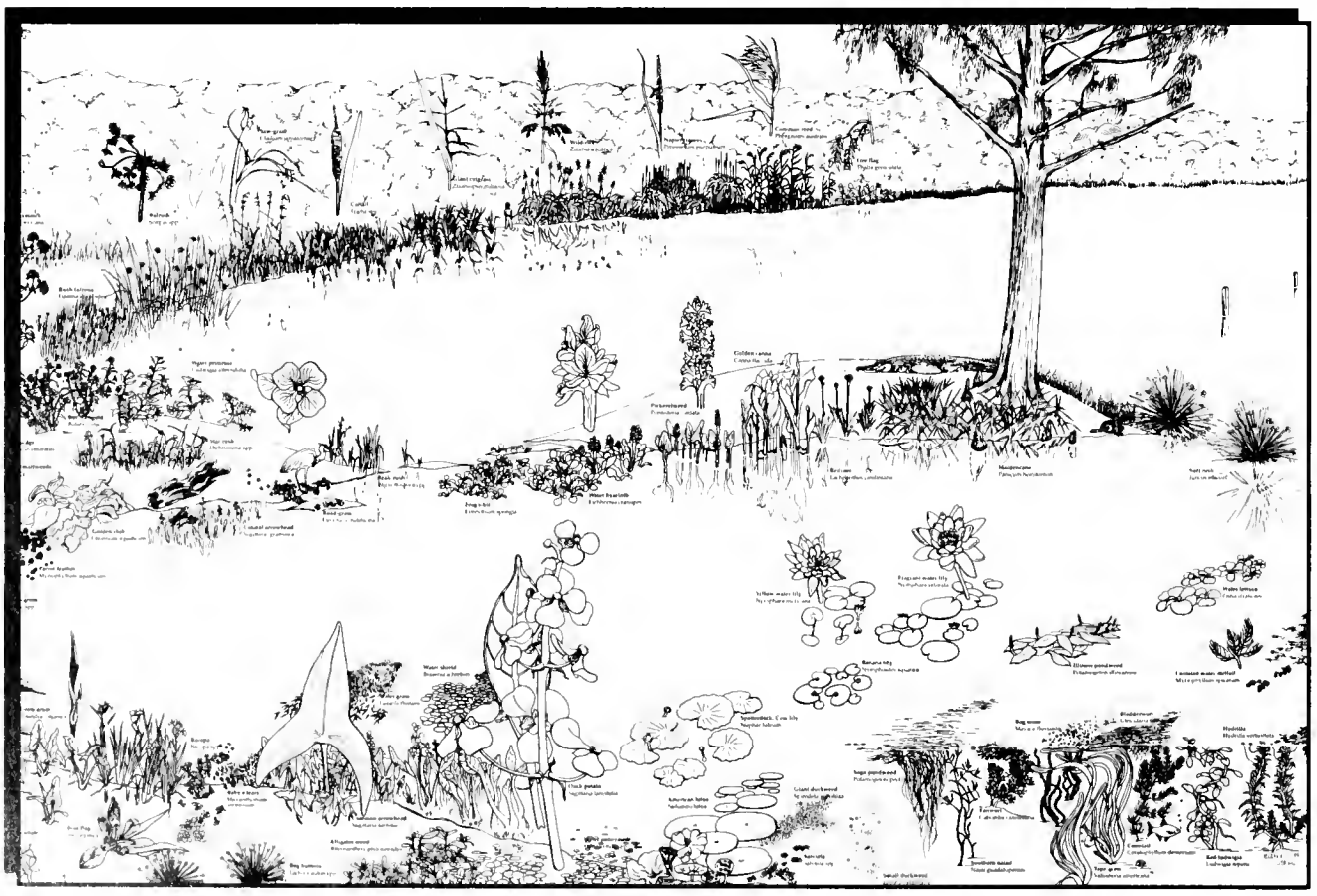
"Sorry"

Sometimes users get to the database search screen but when they attempt to go further they get a message that only says, "Sorry". Because of software user licensing limitations and the unwillingness or confusion of users who do not "quit" their search sessions properly, the number of user channels can be reduced to zero. At this point the "Sorry" message appears, and no one else can get into the database until our office "unlocks" the channels. About ten thousand dollars, the cost of enlarging our user license, would reduce the "Sorry" messages by about three-quarters. When you are finished searching the database, **please quit according to instructions**.

The Database Is Not Easy to Use

Because of the aforementioned financial considerations, use of the APIRS database requires a reasonably knowledgeable user; one who has used other scientific databases such as those in DIALOG, for example. Users who want to search our database by themselves are expected to know, or to read and learn about, the standard Boolean search strategies and specific database commands. Instructions are provided on the "Search Survival Pages" that are accessible from the Web site database page.

For very limited telephone assistance to help solve your telnet problems, you are welcome to call the APIRS office and ask for Vic Ramey or Kimberly Meyer.



Freshwater Plants Poster Again Available

The good news is that the very popular *Freshwater Plants* poster has been printed for the third time. The bad news is that this time it will cost you (unless you are a teacher in Florida, in which case the poster is free.)

After giving away 10,000 copies of the colorful 2' x 3' poster, we now must recoup some of the costs: the posters now cost $7 each plus S/H. No discounts will be given for multiple orders as the poster is being sold at cost.

To order, contact University of Florida, IFAS Publications, Box 110011, Gainesville, FL 32611, (352) 392-1764. Refer to *Freshwater Plants* poster, Publ. SM-51.

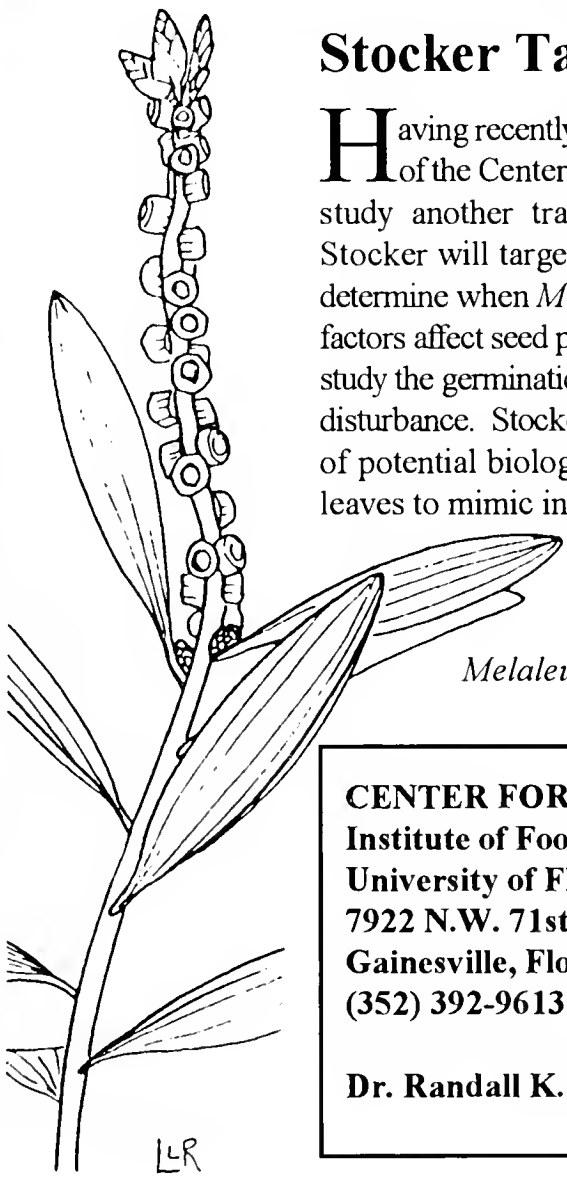
AT THE CENTER

Fox Pounces on New Aquatic Weed

Dr. Alison Fox, Research Assistant Professor, is researching the invasive potential of a relatively new weed in Florida, the aquatic soda apple (*Solanum tampicense*)(pictured at right). Aquatic soda apple has been found proliferating in regularly flooded wetland habitats such as along rivers and in cypress domes. It does not appear to tolerate continuous flooding. The plant is believed to have come from Mexico, the West Indies, and Belize. It has been reported only in a fairly limited area of southwest Florida with the largest and densest single population approaching 150 acres. Dr. Fox is researching the weed potential and management of *Solanum tampicense* in hopes of heading off a potentially massive problem.

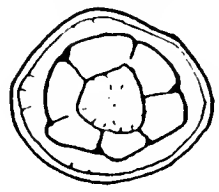
Aquatic soda apple has elongate leaves with indented edges and prickles on the veins of both leaf surfaces. Sprawling stems are up to ½ inch wide, 6 to 15 feet long, and covered in curved prickles. The leaf and stem prickles snag and interlock to form an impenetrable thicket. The stems can climb small trees and bushes to a height of 15 feet. White and yellow tomato-like flowers develop into clusters of up to 11 pea-size berries. The berries turn from green to orange to deep red as they ripen. The presence of the plant amongst a variety of wetland species indicates that it can invade and survive within existing vegetation. Aquatic soda apple grows in both full sunlight and in shade, and reproduces readily from seed. Although the plants do not tolerate frost, the seeds can survive freezing temperatures, indicating that the species could survive as an annual plant in north Florida. The plant also regenerates from stem sections in soil, water, or from cut stumps. It does not regenerate from root sections, nor does it appear to have rhizomes.

Dr. Fox hopes to learn more about the basic biology and ecological impacts of aquatic soda apple as well as methods for controlling the prickly species. She also is requesting confirmed sightings of the plant to more firmly delineate its distribution in Florida. If aquatic soda apple does not turn out to be a threat, another species will have been described. If it *is* a disaster waiting to happen, Fox hopes to get a jump on aquatic soda apple.



Stocker Targets *Melaleuca*

Having recently been transplanted to Florida as the new director of the Center for Aquatic Plants, Dr. Randall Stocker plans to study another transplant to Florida, *Melaleuca quinquenervia*. Stocker will target the reproductive ecology of the invasive tree to determine when *Melaleuca* begins producing seeds, and what other factors affect seed production, release and germination. He also will study the germination of seeds in seed banks and how it is affected by disturbance. Stocker also plans to explore the prediction of impacts of potential biological control agents of *Melaleuca* by clipping the leaves to mimic insect herbivory.



Melaleuca quinquenervia

CENTER FOR AQUATIC PLANTS
Institute of Food and Agricultural Sciences
University of Florida
7922 N.W. 71st Street
Gainesville, Florida 32653
(352) 392-9613

Dr. Randall K. Stocker, Director

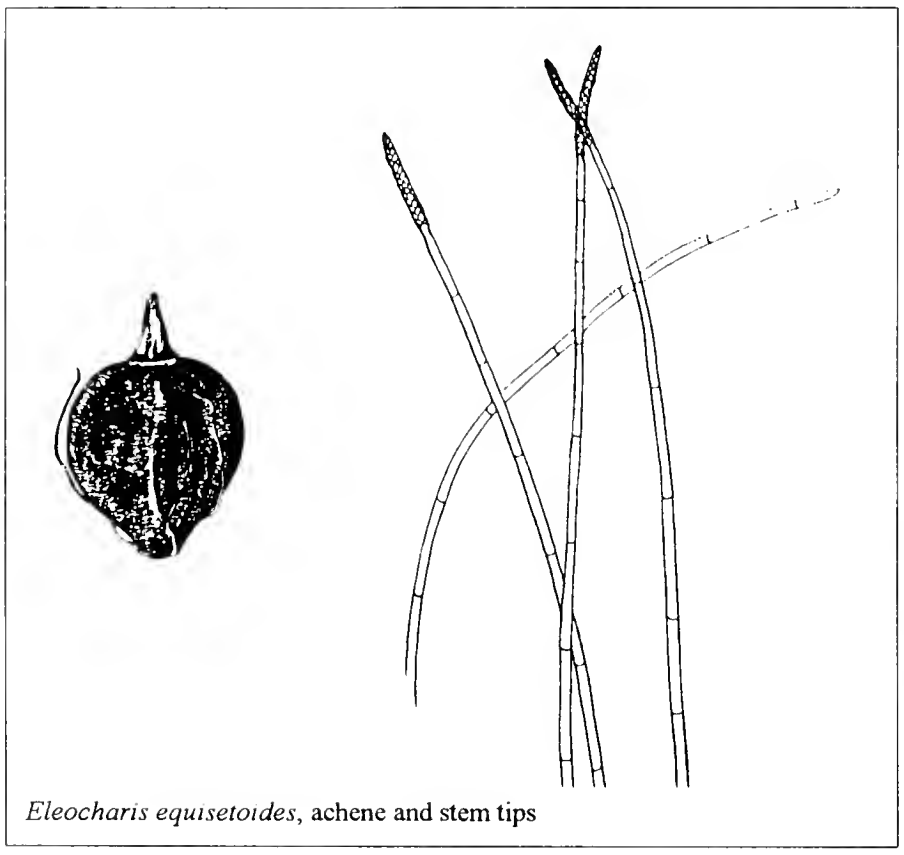
Getting to Know the Natives

THOSE KNOTTY SPIKERUSHES

by **Kathy Craddock Burks, Botanist**, Technical Services, Bureau of Aquatic Plant Management, Florida Department of Environmental Protection, 3917 Commonwealth Blvd., MS 710, Tallahassee, FL 32399, 904/487-2600.

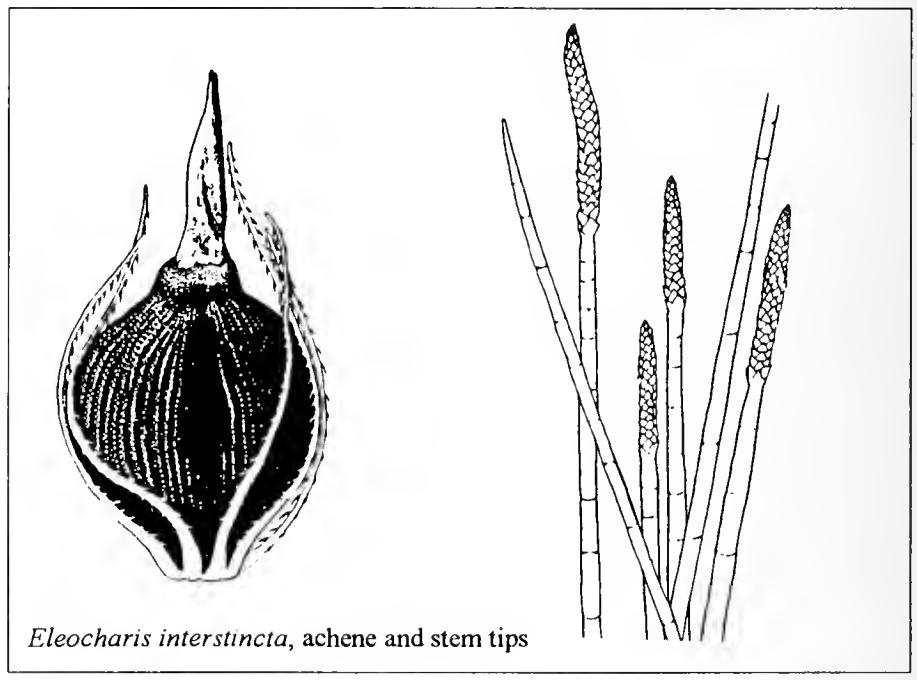
Most of Florida's 28 or 29 species of the sedge genus *Eleocharis* (spikerushes) are diminutive plants, their often-tufted aerial stems reaching no more than 0.5 m in height. A few of our species, however, may soar to 1 m in height. Among these "large" *Eleocharis* are three species whose stems are nodose-septate, i.e., knobby or knotted with conspicuous joints where complete crosswalls (septae) occur.

Probably the most common of these knotted spikerushes is ***E. equisetoides***, which grows in west, north, and central Florida, and ranges northward to Massachusetts, Michigan, and Wisconsin, and westward to Texas and Missouri. Like all spikerushes, this species has no leaf blades (only a bladeless sheath at the base of each unbranched stem); it produces a single flower spike (of spiralled scales) at the stem tips; and its fruits (achenes) have persistent style bases (tubercles). Unlike most *Eleocharis*, this one has a flower spike that is not much wider than the stem below it. You can distinguish this species from the other knotted spikerushes by the regular spacing of the septae, or joints, along the stem, all the way to the tip; by the usually bumpy (nodulose) stem surface between the joints; and by the thin achene bristles shorter than the achene.



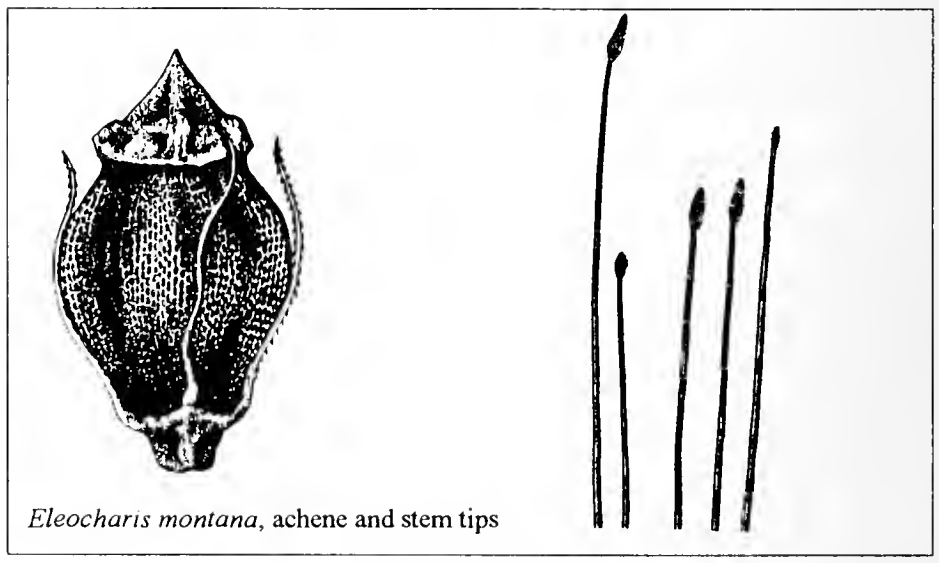
Eleocharis equisetoides, achene and stem tips

The other two knotty species found in Florida, *E. interstincta* and *E. montana*, have tropical affinities. More common in central and south Florida (occurring rarely in north and west Florida), ***E. interstincta*** also ranges west to Texas and south to Bolivia and Brazil. Its stem joints become crowded (closer together) near the stem tip; the internode stem surface is smooth rather than bumpy; and the robust achene bristles are longer than the achene.



Eleocharis interstincta, achene and stem tips

Least common of the knotted spikerushes in Florida, ***E. montana*** ranges north to south Georgia, west across the Sun Belt to Arizona and New Mexico and south through the Carribean and Central America to tropical South America. Its stem joints are spaced regularly but closely together all along the stem (2-5 mm apart); the internode stem surface is smooth; the flower spike is distinctly wider than its stem (about twice as wide); and the achene bristles are of unequal length, some as long as the achene. Another obvious difference is in the tubercles: while the other two species have a narrow conical tubercle topping the achene, this species has a short broad tubercle hugging the achene body.



Eleocharis montana, achene and stem tips

All three species, as well as other spikerushes, provide a food source relished by waterfowl. For more information, contact the Bureau at the address above.

Illustrations from *Aquatic and Wetland Plants of Southeastern United States*, by R.K. Godfrey and J.W. Wooten. 1981. The University of Georgia Press, Athens. Used with permission.

Tropical Aquatic Plants from ... Denmark?!

by Claus Christensen, Tropica® Aquarium Plants, PO Box 3, DK-8530 Hjortshoej, Denmark, **http://www.tropica.dk**

During the past fifty years in Europe, a tradition has evolved of well-equipped aquaria with numerous plants. This has resulted in a suite of producers of aquarium plants. Tropica Aquarium Plants, an aquatic plant nursery in Denmark, is now twenty-five years old and has grown to be among the largest aquatic plant producers of the world. Thirty-two employees produce 1.5 million pots a year, 90% of which are exported all over the world, including Japan, Hong Kong, Germany, The Netherlands, and Canada. 160 different species of aquatic plants are produced, including many species of *Cryptocoryne*, *Echinodorus*, and *Anubias*.

Tropica's total indoor production area consists of 11 plant houses covering about 10,000 m², but less than 20% is in common tank production. A computer controls light, temperature, nutrition, and humidity so that growth conditions are optimal. During the dark winter season, automated high-pressure sodium vapour lights travel across the greenhouses to supply missing sunlight. Due to the salinity of the local water supply, an on-sight reverse osmosis plant is used to produce 20,000 litres of clean, basic water each day.

In the beginning, all plants were grown in indoor ponds. However, our first gathering tours to tropical areas revealed that many submerged plants are actually amphibious - during the dry season, they grow above the water level on lake and river banks. A fraction of our plants are grown submerged to allow the development of submerged leaves and true colors. But accommodation of submerged plants to new environments is often harder because they are more closely adapted to the water and light quality. Today, most of Tropica's plants are grown hydroponically in a substrate of "stonewool." This procedure allows us to control the nutrients to the plants and to apply well-tested production methods such as carbon enrichment of the air. In addition, the plants can be exported to most of the world because soil is avoided in our products. This method produces healthier plants due to the enhanced growth conditions, and they are much easier to handle. Therefore, they are better able to face the acclimatisation period when moved from one environment to another.

TISSUE CULTURE

In addition to vegetative and seed propagation of aquarium plants, Tropica produces some 75 species from tissue culture. Tissue culture propagation is an environmentally compatible mass production method. By starting with plant material free from bacteria, fungi and insects, we reduce the need for pest control. As well as generating disease-free plants, this technique significantly reduces propagation time. Tissue cultured plants are much more uniform in size and form, and many species show a more bushy growth with more adventitious shoots, qualities that many aquarists appreciate.

The first step in tissue culture is to take the plant from the greenhouse and disinfect it for further propagation. This is where we encounter the first hurdle because obtaining a clean plant in the sterilisation process can be very difficult. Often we sterilize 100 plants, but only one will be free from bacteria and fungus. Now we can propagate the sterile plant in the laboratory. After some weeks of growth in sterile glasses, the plants are divided. In this growth phase, the plants have an optimal supply of sugars and vitamins, but we illuminate the plants part of the day to develop the hormonal regulating system. The plants are divided in special laminar airflow benches where work in clean air is possible. In this way, no re-contamination takes place. When enough plants have been produced, some are planted in the nursery to "harden off". New roots for further growth develop and the plants adapt to the natural environment. After a few weeks, the strong and healthy plants are sold.

IMPORT RESTRICTIONS

The USA is one of the few countries of the world to which Tropica can not export aquatic plants, because the US Department of Agriculture requires that imported plants be free of growth medium to avoid soil pests. Because Tropica's plants are grown in stonewool and part of the roots are hidden in this material, they can not be imported. Ironically, this leads to the import of plants collected in nature or from tropical open air nurseries. We know from our gathering tours that such specimens introduce numerous pests and pathogens. In addition, importing collected plants increases the risk of introducing plants with well-known potential damage to the native flora. These plants may enter as weeds or by incorrect use of scientific names. Even countries such as Japan, Australia, and New Zealand - which have very strict import rules - accept our plants for import, occasionally with some kind of quarantine.

Meetings

23RD ANNUAL CONFERENCE ON ECOSYSTEMS RESTORATION & CREATION. May 16-17, 1996. Tampa, Florida.

Sponsored by the Hillsborough Community College Institute of Florida Studies, this annual conference provides a forum for the nationwide exchange of scientific research results in the restoration, creation and management of freshwater and coastal wetlands, uplands and transitional areas.

Contact: F.J. Webb, Dean of Environmental Programs, Hillsborough Community College, Plant City Campus, 1206 N. Park Road, Plant City, Florida 33566; ☎ 813/757-2104.

2ND NATIONAL WORKSHOP ON CONSTRUCTED WETLANDS FOR ANIMAL WASTE MANAGEMENT. May 15-18, 1996. Fort Worth, Texas.

Sponsored by the Texas State Soil and Water Conservation Board, the U.S. Environmental Protection Agency, and Texas A&M University, this workshop will provide training sessions and field tours of constructed wetlands for many uses including treatment of swine waste, aquaculture, agriculture, dairy waste and private homes.

Contact: Paul DuBowy, Department of Wildlife and Fisheries Sciences, Texas A&M University, College Station, TX 77843-2258; ☎ 409/845-5765; fax: 409/845-3786; e-mail: p-dubowy@tamu.edu

INTERNATIONAL CONFERENCE ON PLANTS AND ENVIRONMENTAL POLLUTION. November 26-30, 1996. Lucknow, India.

Organized by the International Society of Environmental Botanists and the National Botanical Research Institute, the conference will discuss the role and potential of terrestrial and aquatic plants in bio-indication and -remediation of environmental pollution. Invited lectures and presented papers will be published in the form of a book.

Contact: K.J. Ahmad, Organizing Secretary ICPEP, National Botanical Research Institute, Lucknow 226 001, India; ☎ (0522) 271031-35, Ext. 209; fax: (0522)282849; e-mail: manager@nbri.sirneted.ernet.in

INTERNATIONAL CONFERENCE ON EUROPEAN LOWLAND WET GRASSLANDS - MANAGEMENT AND RESTORATION FOR BIODIVERSITY. September 17-20, 1996. University of South Bohemia, České Budějovice, Czech Republic.

Organized by the International Centre of Landscape Ecology, Deparatment of Geography, Loughborough University, UK in association with the Darwin Initiative. The aim of the conference is to bring together those concerned with the biodiversity, management and restoration of European floodplain and coastal wet grasslands.

Contact: Gill Giles, ICOLE, Department of Geography, Loughborough University, Loughborough, Leicestershire, LE11 3TU, United Kingdom; ☎ 44 1509 223030; fax: 44 1509 260753; e-mail: G.Giles@lut.ac.uk

VTH INTECOL INTERNATIONAL WETLANDS CONFERENCE. September 22-28, 1996. Perth, Australia. University of Western Australia.

Co-sponsored by the Society of Wetland Scientists, *Wetlands for the Future* is the theme for the 1996 conference. The conference will emphasize our understanding of wetlands now, the importance of conservation and management, and the role of technology in maintaining wetlands in the future.

Contact: J. Davis, School of Biological and Environmental Sciences, Murdoch University, Murdoch, Western Australia 6150; ☎ 61 9 360 2939; fax: 61 9 310 4997; e-mail: davis@essun1.murdoch.edu.au

SECOND INTERNATIONAL SYMPOSIUM ON THE BIOLOGY OF SPHAGNUM. July 11-13, 1996. Quebec City, Canada. Laval University.

Held by the International Association of Bryologists, the symposium will include topics on population biology, community ecology, taxonomy, productivity and peatland ecology. The symposium will be followed by the Fourth Annual Canadian Peatland Restoration Workshop on July 13-14, also at Laval University.

Contact: L. Rochefort, Phytologie, FSAA, Laval University, Quebec, Canada G1K 7P4; fax: 418/656-7856; e-mail: LROC@vm1.ulaval.ca

THE AQUATIC PLANT MANAGEMENT SOCIETY. July 14-17, 1996. Burlington, Vermont.

The latest developments in aquatic plant science and aquatic plant management using biological, mechanical, and chemical control techniques will be discussed. For the first time, the APMS meeting is being held in the northeastern U.S. Current information on biology and control of weedy species in this area, such as Eurasian watermilfoil, water chestnut, and purple loosestrife, will be presented.

Contact: ☎ 904/429-4119

SOCIETY OF WETLAND SCIENTISTS 17TH ANNUAL MEETING. JUNE 9-14, 1996. KANSAS CITY, MISSOURI.

The theme for the 1996 meeting is *From Small Streams to Big Rivers*, and will include technical sessions and workshops, field trips and field workshops.

Contact: Society of Wetland Scientists, Allen Marketing & Management, PO Box 368, Lawrence, KS 66044; fax: 913/843-1274.

3RD INTERNATIONAL CONFERENCE ON RESERVOIR LIMNOLOGY AND WATER QUALITY. August 31 - September 5, 1997. České Budějovice, Czech Republic.

The aim of the conference is to bring together limnologists and water quality engineers dealing specifically with reservoir limnology or topics relevant to understanding, predicting and managing reservoir water quality.

Contact: Jaroslav Vrba, Conference Secretary, Hydrobiological Institute, Academy of Sciences of the Czech Republic, Na sádkách 7, CZ-370 05 České Budějovice, Czech Republic, ☎ 42-38-45484; fax: 42-38-45718; e-mail: hbu@dale.entu.cas.cz

39TH ANNUAL CONFERENCE ON GREAT LAKES RESEARCH. May 26-30, 1996. Mississauga, Ontario, Canada. University of Toronto, Erindale College.

Special sessions will cover a variety of current large lakes issues such as the effectiveness of international management agreements, non-native species, effects of UV radiation, human health, sea lamprey controls, satellite imagery, food web interactions, and wetland restoration.

Contact: W. Gary Sprules, Department of Zoology, Erindale College, University of Toronto, Mississauga, Ontario L5L 1C6, Canada; ☎ 905/828-3987; fax: 905/828-3792; e-mail: gsprules@cyclops.erin.utoronto.ca

THE AQUATIC WEED CONTROL, AQUATIC PLANT CULTURE & REVEGETATION SHORT COURSE. May 14-16, 1996. Fort Lauderdale, Florida. University of Florida.

Topics include plant identification, plant propagation and revegetation, biological control of weeds and herbicide technology.

Contact: University of Florida, IFAS Office of Conferences, PO Box 110750, Gainesville, FL 32611-0750; ☎ 352/392-5930; fax: 352/392-9734; e-mail: CONF@GNV.IFAS.UFL.EDU

16TH ANNUAL INTERNATIONAL SYMPOSIUM OF THE NORTH AMERICAN LAKE MANAGEMENT SOCIETY. November 13-16, 1996. Minneapolis, Minnesota.

The conference program title is *People, Lakes, and Land: Puzzling Relationships*. The symposium will address important developments in lake and watershed management for both professionals and lay people.

Contact: NALMS, PO Box 101294, Denver, CO, USA 80250; ☎ 303/781-8287; fax: 303/781-6538

FLORIDA LAKE MANAGEMENT SOCIETY ANNUAL CONFERENCE. May 22-24, 1996. Ocala, Florida.

The theme of this seventh annual conference is *Decision Making in Lake Management.*

Contact: M. Hoyer, University of Florida, Department of Fisheries and Aquatic Sciences, 7922 NW 71st St., Gainesville, FL, 32653; ☎ 352/392-9617 X 227.

FLORIDA AQUATIC PLANT MANAGEMENT SOCIETY. October 8-10, 1996. Fort Myers, Florida.

This will be the 20th annual meeting of the FAPMS. An equipment demonstration is planned in addition to presentations on aquatic plant management in Florida.

Contact: S. Redovan, ☎ 941/694-2174.

SIXTEENTH ASIAN PACIFIC WEED SCIENCE SOCIETY CONFERENCE. September 1997. Kuala Lumpur, Malaysia.

Contact: Baki Hj. Bakar, Organizing Secretary, The 16th APWSS Conference, c/o Botany Department, University of Malaya, 59100 Kuala Lumpur, Malaysia; ☎ 603-7594351; fax: 603-7594178; e-mail: baki@botany.um.edu.my

Books/Reports

FRESHWATER ALGAE, THEIR MICROSCOPIC WORLD EXPLORED, by H. Canter-Lund and J.W.G. Lund. 1995. 360 pp. ISBN 0-948737-25-5
(Order from Biopress Ltd., The Orchard, Clanage Road, Bristol BS3 2JX, England, UNITED KINGDOM. £49.50 plus S/H.)

Here is a science book that might also sell as a "coffee table" art book; the subject so fascinating, the photographs so captivating. Written by fellows of England's Freshwater Biological Association, this large-format volume is an introduction to all the major freshwater algal groups, together with parasitic fungi, protozoan and other invertebrate predators.

The very high quality alga portraits (387 in color, 640 altogether) are a delightful sampler of the many colors and shapes to be found among algae. They are complemented by a very readable text, written for laymen, which answers the basics: what arc algae? where are they found? how do they live? This book will find its way into many libraries, from home to university.

RESTORATION OF STREAM ECOSYSTEMS--AN INTEGRATED CATCHMENT APPROACH, edited by M. Eiseltova and J. Biggs. 1995. 170 pp.
(Order from the Natural History Book Service, 2-3 Wills Road, Totnes, TQ9 5XN, Devon, UNITED KINGDOM. IWRB Publ. 37. £20.00 plus S/H.)

Around the world, "restoration ecologists" are attempting to repair the damage to rivers and floodplains altered or destroyed by the construction of dams and by channelization for flood control and boat traffic.

This volume, the second in the series of IWRB's wetland management training handbooks, is aimed at ecologists, engineers and planners who are responsible for restoration projects, and also to agriculture, forestry and development planners and managers.

The book includes a dozen case studies about the "remeandering" (unchannelizing?) of rivers, structuring stream beds, and other essential acts for re-making rivers. The case studies are focused on Central and Eastern Europe.

TROPICAL FRESHWATER WETLANDS, A GUIDE TO CURRENT KNOWLEDGE AND SUSTAINABLE MANAGEMENT, by H. Roggeri. 1995. 364 pp. ISBN 07923-3785-9
(Order from Kluwer Academic Publishers, Order Dept., POB 358, Accord Station, Hingham, MA 02018-0358. US$134.00.)

The author of this wetlands management "guide" for professionals notes that even though wetlands have "an importance which is comparable to that of the tropical forest", many people in developing countries as well as many development and nature conservation planners and managers fail to appreciatc the "highly valuable services and products" provided by wetlands, and some have yet "to become acquainted with wetlands".

The main purpose of the book is "to help provincial planners choose, develop and carry out" a "new" kind of wetland management, a kind that seeks "to make the best of the benefits offered by nature, rather than transform or eradicate nature." After sections in which freshwater wetlands are defined, wetland functions and values are reviewed, and "interventions" arc examined, the author presents guiding principles and practical approaches to thc sustainable management of wetlands.

Thirteen case studies of wetlands management in various developing countries are presented, including 7 in Africa. Several appendices, including a bibliography of some 900 citations, complete the volume.

VÍZINÖVÉNYEK, by Z. Tuba, illustrated by K. Bíró, 1987, reprinted 1995, 64 pp. ISBN 96311-7263-5 (In Hungarian.)
(For ordering information, contact Dr. Zoltán Tuba, Dept. Bot. & Plant Physiol., Agricultural University of Godollo, Pater K U 1, H-2103 Godollo, HUNGARY; tuba@fa.gau.hu)

This is a colorful guide to 122 species of aquatic plants of Hungary, complete with basic morphological and ecological information about each plant. Each plant is depicted in a nicely done water color. The small format book includes an index of common names; *nyilfu* is the common Hungarian name for *Sagittaria sagittifolia*, *sarga vizitok vagy tavirozsa* is *Nuphar lutea*.

DEVELOPMENT OF AN AUTOMATED SYSTEM FOR DETECTION AND MAPPING OF SUBMERSED AQUATIC VEGETATION WITH HYDROACOUSTIC AND GLOBAL POSITIONING SYSTEM TECHNOLOGIES, Report 1 - The Submersed Aquatic Vegetation Early Warning System (SAVEWS) - System Description and User's Guide (Version 1.0), by B.M. Sabol and R.E. Melton. 1995. 37 pp.
(For information, contact Bruce Sabol, USACE, Waterways Experiment Station, EL-EN-C, 3909 Halls Ferry Rd., Vicksburg, MS 39180, sabol@ex1.wes.army.mil)

This report describes a portable system that can be managed by two people and is operable from a small boat, that is able to detect and map submersed (not topped out) plants from the surface in real time in areas of up to several thousand acres at one time.

It was made using commercially available, off-the-shelf components. The system's total cost was less than $50,000, in 1993-94 US dollars.

COMMON PLANTS OF FLORIDA'S AQUATIC PLANT INDUSTRY, SECTION 3 OF AQUATIC PLANT INSPECTION MANUAL, by N.C. Coile. 1995. 131 pp.
(Order from Office of Technical Assistance, Division of Plant Industry, Florida Department of Agriculture & Consumer Services, POB 147100, 1911 SW 34 ST., Gainesville, FL 32614-7100, (352) 372-3505. $15.00 plus postage.)

This looseleaf manual offers identification information about 87 species that are commonly sold by Florida's aquatic plant industry. While the publication was originally intended for the use of Florida Bureau of Plant Inspection workers, it also might be of interest to nurserymen and others. We suppose that such a manual as this would be useful in Florida insofar as many of the

species treated here are not included in other references which cover native Florida plants. Unfortunately, most of the images selected to represent the various plants leave something to be desired, and closeups or detailed drawings that might enable more accurate identification are lacking.

PLANT SURVIVAL: ADAPTING TO A HOSTILE WORLD, by B. Capon. 1994. 140 pp.
(Order from Timber Press, Inc., 133 SW 2 Ave., Suite 450, Portland, OR 97204-3527, (503) 227-2878. Hardback: $24.95 plus S/H; Paper: $15.95 plus S/H.)

This introduction to plant ecology was "written especially for young readers" by a university botany professor. It tells how plants have adapted to live almost anywhere, from the arctic tundra to tropical jungles, from the deserts to lakes and oceans. Many interesting questions are simply answered: why do water lily leaves feel waxy? what is the purpose of bald cypress knees? how do high mountain plants protect themselves from ultraviolet rays? The answers are illustrated by colorful pencil drawings. Though written for middle school audiences, there is enough here to engage the interest of almost any science reader.

PRINCIPLES AND PRACTICE OF PLANT CONSERVATION, by D.R. Given. 1994. 292 pp. ISBN 0-88192-249-8
(Order from Timber Press, Inc., 133 SW 2 AVE, Suite 450, Portland, OR 97204-3527, (503) 227-2878. Hardback: $39.95 plus S/H.)

According to the author, "Strict preservationism is not the same as conservation. Conservation may advocate preservation of species and ecosystems but may also advocate use of them, providing this is not wasteful...A challenge for conservation is to seek a middle stance, sometimes promoting preservation, but at other times supporting controlled exploitation."

This comprehensive handbook for practicing conservationists is "the first detailed overview ever to be published of this vitally important subject"; it explains the concepts and principles underlying successful plant conservation. It was commissioned by the World Wide Fund for Nature (WWF) and the World Conservation Union (IUCN).

Included are chapters on how plants become threatened or extinct; plant population management; managing protected natural areas; "off-site" conservation in botanic gardens and gene banks; as well as chapters devoted to ethics; education; conservation legislation; and the economics of plant conservation.

MANUAL DE IDENTIFICACION DE PLANTAS ACUATICAS DEL PARQUE NACIONAL LAGUNAS DE ZEMPOALA, MEXICO, by J.R. Bonilla-Barbosa and A. Novelo Retana. 1995. 169 pp. ISBN 968-36-4335-3 (In Spanish)
(For information, contact Universidad Nacional Autonoma de Mexico, Instituto de Biologia, Apartado postal 70-233, 04510 Mexico, DF, MEXICO.)

This volume contains descriptions of the morphology and vegetation of seven Mexican lakes. Included are descriptions of 66 aquatic plant species which include information about flowering, fruiting, habitat, and distribution.

CACHE RIVER BASIN, ARKANSAS: ENVIRONMENTAL DATABASE, COMPACT DISK DATA ARCHIVE, AND METADATA DOCUMENTATION, by R. Kress and S. Bourne. 1995. 46 pp. and 1 CD.
(For information, contact Public Affairs Office, U.S. Army Engineer, Waterways Experiment Station, 3909 Halls Ferry Road, Vicksburg, MS 39180-6199, (601) 634-2502. Technical Report WRP-SM-13)

This investigation designed a digital database for numerical and spatial analysis of a wetlands system. The prototype was developed for the Cache River watershed. It is one of the first environmental databases to conform to new federal regulations and standards for geographic data, acquisition, storage and access, as ordered by President Clinton in Executive Order 12906, April 11, 1994.

The databases on the CD include those on topography, hydrology, soils, vegetation, wildlife, meteorology, wetland maps, cultural boundaries, satellite images and field measurement locations.

AQUACULTURE IN THE UNITED STATES, A Historical Survey, by R.R. Stickney. 1996. 372 pp. ISBN 0-4711-3154-7
(Order from John Wiley & Sons, Inc., 605 Third Ave., New York, NY 10158, (800) 225-5945. $49.95.)

The author defines aquaculture as "the rearing of aquatic organisms under controlled or semicontrolled conditions", a definition that includes plants as well as animals.

This history goes into detail about early U.S. fish culturists, Spencer Baird and the establishment of the U.S. Fish and Fisheries Commission (in 1871), the development of fish culture first as an industry and then as a science, species lists and shipping tonnage, the beginnings of the American Fisheries Society, on up to the establishment of the World Mariculture Society (1969) and finally to current day issues: "hatchery bashing", high land costs, protecting species vs. protecting stocks, etc.

WETLAND PLANTS FROM TEST TUBES, by C.B. Burgess. 1995. 36 pp.
(Order from North Carolina Sea Grant, Box 8605, N.C. State University, Raleigh, NC 27695-8605. Publication No. UNC-SG-95-08.)

"No Wetlands, No Seafood." But, when wetlands are destroyed or are otherwise in need of restoration or "mitigation", where do we find the plants to plant in them?

Rather than raiding existing wetlands for plant material, we can now employ biotechnology and the methods of tissue culture, or "micropropagation", to produce as many plants as needed for wetland restoration.

This book, though not exactly a how-to manual, does answer the most often asked questions by resource managers, developers and others about tissue culture: What are the basics? What are the five steps of tissue culture? What about genetic variation (or lack thereof)? What laws apply and how is the industry coming along?

Chapters deal with seagrasses, as well as dune and wetland plants.

FROM THE DATABASE

Here is a sampling of the research articles, books and reports which have been entered into the aquatic plant database since December 1995.

The database has more than 42,000 citations. To receive free bibliographies on specific plants and/or subjects, contact APIRS at the address shown on the mail label on page 16, or use the database online at http://aquat1.ifas.ufl.edu/

To obtain articles, contact your nearest state or university library.

Adamec, L.
Oxygen budget in the traps of *Utricularia australis*.
CARNIV. PLANT NEWSL. 24:42-45. 1995.

Ahern, J.; Lyons, J.; McClelland, J.; Valiela, I.
Invertebrate response to nutrient-induced changes in macrophyte assemblages in Waquoit Bay.
BIOL. BULL. 189(2):241-242. 1995.

Allison, S.K.
Recovery from small-scale anthropogenic disturbances by northern California salt marsh plant assemblages.
ECOL. APPLICATIONS 5(3):693-702. 1995.

Amat, J.A.
Effects of wintering greylag geese *Anser anser* on their *Scirpus* food plants.
ECOGRAPHY 18(2):155-163. 1995.

Amritphale, D.; Gutch, A.; Hsiao, A.I.
Phytochrome-mediated germination control of *Hygrophila auriculata* seeds following dry storage augmented by temperature pulse, hormones, anaerobiosis or osmoticum imbibition.
ENVIRON. EXPER. BOT. 35(2):187-192. 1995.

Anderson, N.O.; Ascher, P.D.
Style morph frequencies in Minnesota populations of *Lythrum* (Lythraceae) II. Tristylous *L. salicaria* L.
SEXUAL PLANT REPRODUCTION 8(92):105-112. 1995.

Appenroth, K.J.; Oelmuller, R.
Regulation of transcript level and nitrite reductase activity by phytochrome and nitrate in turions of *Spirodela polyrhiza*.
PHYSIOLOGIA PLANTARUM 93:272-278. 1995.

Bailey, F.C.; Knight, A.W.; Ogle, R.S.; Klaine, S.J.
Effect of sulfate level on selenium uptake by *Ruppia maritima*.
CHEMOSPHERE 30(3):579-591. 1995.

Barber, J.T.; Sharma, H.A.; Ensley, H.E.; et al
Detoxification of phenol by the aquatic angiosperm, *Lemna gibba*.
CHEMOSPHERE 31(6):3567-3574. 1995.

Bartodziej, W.; Weymouth, G.
Waterbird abundance and activity on waterhyacinth and egeria in the St. Marks River, Florida.
J. AQUATIC PLANT MANAGE. 33:19-22. 1995.

Beffagna, V.; Romani, G.; Gatti, L.
Changes in chloride fluxes and cytosolic pH induced by abscisic acid in *Elodea densa* leaves.
BOT. ACTA 108(2):74-79. 1995.

Belanger, L.; Bedard, J.
Foraging ecology of greater snow geese, *Chen caerulescens atlantica*, in different *Scirpus* marsh plant communities.
CANADIAN FIELD-NATURALIST 108(3):271-281. 1994.

Beyers, D.W.
Acute toxicity of rodeo herbicide to Rio Grande silvery minnow as estimated by surrogate species: plains minnow and fathead minnow.
ARCH. ENVIRON. CONTAM. TOXICOL. 29(1):24-26. 1995.

Biernacki, M.; Lovett Doust, J.; Lovett Doust, L.
Effects of trichloroethylene, plant sex and site of origin on modular demography in *Vallisneria americana*.
J. APPL. ECOL. 32:761-777. 1995.

Bishop, J.H.
Evaluation of the removal of treated municipal effluent on water chemistry and the abundance of submersed vegetation in Kings Bay - Crystal River, Florida.
MASTER'S THESIS, UNIVERSITY OF FLORIDA, GAINESVILLE, 65 PP. 1995.

Blossey, B.; Schroeder, D.
Host specificity of three potential biological weed control agents attacking flowers and seeds of *Lythrum salicaria* (purple loosestrife).
BIOLOGICAL CONTROL 5(1):47-53. 1995.

Boeye, C.; van Straaten, D.; Verheyn, R.F.
A recent transformation from poor to rich fen caused by artificial groundwater recharge.
J. HYDROLOGY 169(1-4):111-129. 1995.

Bowmer, K.H.; Jacobs, S.W.L.; Sainty, G.R.
Identification, biology and management of *Elodea canadensis*, Hydrocharitaceae.
J. AQUATIC PLANT MANAGE. 33:13-19. 1995.

Brewer, C.A.; Smith, W.K.
Leaf surface wetness and gas exchange in the pond lily *Nuphar polysepalum* (Nymphaeaceae).
AM. J. BOT. 82(10):1271-1277. 1995.

Brock, T.C.M.; Roijackers, R.M.M.; Rollon, R.; et al
Effects of nutrient loading and insecticide application on the ecology of *Elodea*-dominated freshwater microcosms II. Responses of macrophytes, periphyton and macroinvertebrate grazers.
ARCH. HYDROBIOL. 134(1):53-74. 1995.

Bruhl, J.J.; Perry, S.
Photosynthetic pathway-related ultrastructure of C_3, C_4, and C_3-like C_3-C_4 intermediate sedges (Cyperaceae), with special reference to *Eleocharis*.
AUST. J. PLANT PHYSIOL. 22(4):521-530. 1995.

Bubier, J.L.
The relationship of vegetation to methane emission and hydrochemical gradients in northern peatlands.
J. ECOL. 83(3):403-420. 1995.

Budd, J.; Lillie, R.A.; Rasmussen, P.
Morphological characteristics of the aquatic macrophyte, *Myriophyllum spicatum* L., in Fish Lake, Wisconsin.
J. FRESHWATER ECOL. 10(1):19-31. 1995.

Catling, P.M.; Porebski, Z.S.
The spread and current distribution of European frogbit, *Hydrocharis morsus-ranae* L., in North America.
CAN. FIELD-NATURALIST 109(2):236-241. 1995.

Chapin, C.T.; Pastor, J.
Nutrient limitations in the northern pitcher plant *Sarracenia purpurea*.
CAN. J. BOT. 73(5):728-734. 1995.

Chapman, L.J.; Liem, K.F.
Papyrus swamps and the respiratory ecology of *Barbus neumayeri*.
ENVIRON. BIOL. FISHES 44(1-3):183-197. 1995.

Cherrill, A.
Infestation of improved grasslands by *Juncus effusus* L. in the catchment of the River Tyne, Northern England: a field survey.
GRASS FORAGE SCI. 50(1):85-91. 1995.

Chick, J.H.; McIvor, C.C.
Patterns in the abundance and composition of fishes among beds of different macrophytes: viewing a littoral zone as a landscape.
CAN. J. FISH. AQUAT. SCI. 51(12):2873-2882. 1994.

Claveri, B.; Mouvet, C.
Temperature effects on copper uptake and CO_2 assimilation by the aquatic moss *Rhynchostegium riparioides*.
ARCH. ENVIRON. CONTAM. TOXICOL. 28(3);314-320. 1995.

Clayton, J.S.; Tanner, C.C.
Environmental persistence and fate of arsenic applied for aquatic weed control.
IN: ARSENIC IN THE ENVIRONMENT, PART I: CYCLING AND CHARACTERIZATION, J.O. NRIAGU, ED., JOHN WILEY & SONS, PP. 345-363. 1994.

Clevering, O.A.; van der Putten, W.H.
Effects of detritus accumulation on the growth of *Scirpus maritimus* under greenhouse conditions.
CAN. J. BOT. 73(6):852-861. 1995.

Cole, C.A.; Bratton, S.
Freshwater wetlands of Cape Hatteras National Seashore: water quality in a resort setting.
NATURAL AREAS J. 15(2):136-147. 1995.

Coops, H.; van der Velde, G.
Seed dispersal, germination and seedling growth of six helophyte species in relation to water-level zonation.
FRESHWATER BIOLOGY 34:13-20. 1995.

Coquery, M.; Welbourn, P.M.
The relationship between metal concentration and organic matter in sediments and metal concentration in the aquatic macrophyte *Eriocaulon septangulare*.
WAT. RES. 29(9):2094-2102. 1995.

Craft, C.B.; Vymazal, J.; Richardson, C.J.
Response of Everglades plant communities to nitrogen and phosphorus additions.
WETLANDS 15(3):258-271. 1995.

Crawford, D.J.; Landolt, E.
Allozyme divergence among species of *Wolffia* (Lemnaceae).
PLANT SYST. EVOL. 197(1-4):59-69. 1995.

Creed, R.P.; Sheldon, S.P.
Weevils and watermilfoil: did a North American herbivore cause the decline of an exotic plant?
ECOL. APPL. 5(4):1113-1121. 1995.

Cuda, J.P.
Utilization of pennyworts (*Hydrocotyle* spp.) as food plants by the southern armyworm, *Spodoptera eridania* (Cramer) (Lepidoptera: Noctuidae).
AQUATICS 17(4):4,6,8,10.

Daehler, C.C.; Strong, D.R.
Impact of high herbivore densities on introduced smooth cordgrass, *Spartina alterniflora*, invading San Francisco Bay, California.
ESTUARIES 18(2):409-417. 1995.

Daldorph, P.W.G.; Thomas, J.D.
Factors influencing the stability of nutrient-enriched freshwater macrophyte communities: the role of sticklebacks *Pungitius pungitius* and freshwater snails.
FRESHWATER BIOL. 33:271-289. 1995.

DePrado, R.; Romera, E.; Menendez, J.
Atrazine detoxification in *Panicum dichotomiflorum* and target site *Polygonum lapathifolium*.
PESTICIDE BOCHEM. PHYSIOL. 52(1):1-11. 1995.

Doyle, R.D.; Smart, R.M.
Potential use of native aquatic plants for long-term control of problem aquatic plants in Guntersville Reservoir, Alabama: Report 2. Competitive interactions between beneficial and nuisance species.
TECH. REPT. A-93-6, US ARMY CORPS OF ENGINEERS, WATERWAYS EXPERIMENT STN., AQUATIC PLANT CONTROL RESEARCH PROGRAM, VICKSBURG, MS, 52 PP. 1995.

Elster, J.; Kvet, J.; Hauser, V.
Root length of duckweeds (Lemnaceae) as an indicator of water trophic status.
EKOLOGIA (BRATISLAVA) 14(1):43-59. 1995.

Ervik, F.; Renner, S.S.; Johanson, K.A.
Breeding system and pollination of *Nuphar luteum* (L.) Smith (Nymphaeaceae) in Norway.
FLORA 190(2):109-113. 1995.

Fahey, L.L.; Crow, G.E.
The vegetation of Pequawket Bog, Ossipee, New Hampshire.
RHODORA 97(889):39-92. 1995.

Fennessy, M.S.; Cronk, J.K.; Mitsch, W.J.
Macrophyte productivity and community development in created freshwater wetlands under experimental hydrological conditions.
ECOL. ENGINEERING 3(4):469-484. 1994.

Flaig, E.G.; Havens, K.E.
Historical trends in the Lake Okeechobee ecosystem I. Land use and nutrient loading.
ARCH. HYDROBIOL. SUPPL. 107(1):1-24. 1995.

Flint, N.A.; Madsen, J.D.
The effect of temperature and daylength on the germination of *Potamogeton nodosus* tubers.
J. FRESHWATER ECOL. 10(2):125-128. 1995.

Grasmuck, N.; Haury, J.; Leglize, L.; Muller, S.
Assessment of the bio-indicator capacity of aquatic macrophytes using multivariate analysis.
HYDROBIOLOGIA 300/301:115-122. 1995.

Greger, M.; Kautsky, L.; Sandberg, T.
A tentative model of Cd uptake in *Potamogeton pectinatus* in relation to salinity.
ENVIRON. EXP. BOT. 35(2):215-225. 1995.

Groenveld, D.P.; French, R.H.
Hydrodynamic control of an emergent aquatic plant (*Scirpus acutus*) in open channels.
WATER RESOURCES BULL. 31(3):505-514. 1995.

Gupta, M.; Rai, U.N.; Tripathi, R.D.; Chandra, P.
Lead induced changes in glutathione and phytochelatin in *Hydrilla verticillata* (L.f.) Royle.
CHEMOSPHERE 30(10):2011-2020. 1995.

Harris, T.T.; Williges, K.A.; Zimba, P.V.
Primary productivity and decomposition of five emergent macrophyte communities in the Lake Okeechobee marsh ecosystem.
ARCH. HYDROBIOL. SPEC. ISSUES ADVANCES IN LIMNOL. 45:63-78. 1995.

Haslam, S.M.
A discussion of the strength (durability) of thatching reed (*Phragmites australis*) in relation to habitat.
REED RESEARCH REPORT X, DEPT. PLANT SCIENCES, UNIV. CAMBRIDGE, ENGLAND, 56 PP. 1995.

Hatcher, P.E.; Ayres, P.G.; Paul, N.D.
The effect of natural and simulated insect herbivory, and leaf age, on the process of infection of *Rumex crispus* L. and *R. obtusifolius* L. by *Uromyces rumicis* (Schum.) Wint.

NEW PHYTOL. 130(2):239-249. 1995.

Henderson, P.A.; Hamilton, H.F.
Standing crop and distribution of fish in drifting and attached floating meadows within an upper Amazonian varzea lake.
J. FISH. BIOL. 47(2):266-276. 1995.

Hickman, S.
Improvement of habitat quality nesting and migrating birds at the Des Plaines River Wetlands Demonstration Project.
ECOL. ENGINEERING 3(4):485-494. 1994.

Hight, S.D.; Blossey, B.; Laing, J.; Declerck-Floate, R.
Establishment of insect biological control agents from Europe against *Lythrum salicaria* in North America.
ENVIRON. ENTOMOL. 24(4):967-977. 1995.

Hroudova, Z.; Zakravsky, P.
Butomus umbellatus-community in the Czech and Slovak Republics.
PRESLIA, PRAHA 66:97-114. 1994.

Hruby, T.; Cesanek, W.E.; Miller, K.E.
Estimating relative wetland values for regional planning.
WETLANDS 15(2):93-107. 1995.

Jacob, J.; Greitner, C.; Drake, B.G.
Acclimation of photosynthesis in relation to Rubisco and nonstructural carbohydrate contents and *in situ* carboxylase activity in *Scirpus olneyi* grown at elevated CO_2 in the field.
PLANT CELL ENVIRON. 18(8):875-884. 1995.

Jacobsen, D.; Sand-Jensen, K.
Variability of invertebrate herbivory on the submerged macrophyte *Potamogeton perfoliatus*.
FRESHWATER BIOL. 34(2):357-365. 1995.

Jasser, I.
The influence of macrophytes on a phytoplankton community in experimental conditions.
HYDROBIOLOGIA 306(1):21-32. 1995.

Johnson, J.R.; Bird, K.T.
The effects of the herbicide atrazine on *Ruppia maritima* L. growing in autotrophic versus heterotrophic cultures.
BOTANICA MARINA 38:307-312.

Johnson, S.R.
Spider communities in the canopies of annually burned and long-term unburned *Spartina pectinata* wetlands.
ENVIRON. ENTOMOL. 24(4):832-834. 1995.

Kammerer, M.
Intoxication by glyphosate based herbicides.
RECUEIL DE MEDECINE VETERINAIRE 171(2-3):149-152 (IN FRENCH; ENGLISH SUMMARY)

Khalfaoui, B.; Meniai, A.H.; Borja, R.
Removal of copper from industrial wastewater by raw charcoal obtained from reeds.
J. CHEM. TECH. BIOTECHNOL. 64(2):153-156. 1995.

Kohlmeyer, J.; Volkmann-Kohlmeyer, B.; Eriksson, O.E.
Fungi on *Juncus roemerianus* 2. New dictyosporous ascomycetes.
BOTANICA MARINA 38:165-174. 1995.

Kornijow, R.; Kairesalo, T.
A simple apparatus for sampling epiphytic communities associated with emergent macrophytes.
HYDROBIOLOGIA 294(2):141-143. 1994.

Leonard, L.A.; Hine, A.C.; Luther, M.E.
Surficial sediment transport and deposition processes in a *Juncus roemerianus* marsh, west-central Florida.
J. COASTAL RESEARCH 11(2):322-336. 1995.

Lowe-McConnell, R.H.
The changing ecosystem of Lake Victoria, East Africa.
FBA FRESHWATER FORUM 4(2):76-89. 1994.

Ludlow, J.
Management of aquatic plant communities in Rodman Reservoir from 1969-1994.
AQUATICS 73(3):11, 13-15. 1995.

Lytle, C.M.; Smith, B.N.
Seasonal nutrient cycling in *Potamogeton pectinatus* of the Lower Provo River.
GREAT BASIN NATURALIST 55(2):164-168. 1995.

Madsen, T.V.; Breinholt, M.
Effects of air contact on growth, inorganic carbon sources, and nitrogen uptake by an amphibious freshwater macrophyte.
PLANT PHYSIOL. 107:149-154. 1995.

Mallison, C.T.; Hestand, R.S.; Thompson, B.Z.
Removal of triploid grass carp with an oral rotenone bait in two central Florida lakes.
LAKE AND RESERVOIR MANAGE. 11(4):337-342. 1995.

Mazzeo, N.
Revision of family Lemnaceae in Chile.
GAYANA BOT. 50(1):29-40. 1993. (IN SPANISH; ENGLISH SUMMARY)

Mazzeo, N.; Gorga, J.; Crosa, D.;

Ferrando, J.; Pintos, W.
Spatial and temporal variation of physicochemical parameters in a shallow reservoir seasonally covered by *Pistia stratiotes* L. in Uruguay.
J. FRESHWATER ECOL. 10(2):141-149. 1995.

McKnight, S.K.; Hepp, G.R.
Potential effects of grass carp herbivory on waterfowl foods.
J. WILDL. MANAGE. 59(4):720-727. 1995.

Mendelssohn, I.A.; Kleis, B.A.; Wakeley, J.S.
Factors controlling the formation of oxidized root channels: a review.
WETLANDS 15(1):37-46. 1995.

Merchant, M.
The effect of pattern and severity of cutting on the vigour of the soft rush (*Juncus effusus* L.).
GRASS FORAGE SCI. 50(1):81-84. 1995.

Mesleard, F.; Grillas, P.; Ham, L.T.
Restoration of seasonally-flooded marshes in abandoned ricefields in the Camargue (southern France) - Preliminary results on vegetation and use by ducks.
ECOL. ENGINEERING 5(1):95-106. 1995.

Mitchell, G.J.; Carter, R.J.; Chinner, S.R.
Studies on the control of water-dropwort (*Oenanthe pimpinelloides*) in South Australia.
AUST. J. EXPER. AGRIC. 35(4):483-488. 1995.

Mossler, M.A.; Shilling, D.G.; Milgram, K.E.; Querns, R.
A quality control standard for fluridone analysis.
J. AQUATIC PLANT MANAGE. 33:23-24. 1995.

Narasimhalu, P.; McRae, K.B.; Kunelius, H.T.
Hay composition, and intake and digestibility in sheep of newly introduced cultivars of timothy, tall fescue, and reed canarygrass.
ANIMAL FEED SCI. TECHNOL. 55(1-2):77-85.

Nelson, L.S.; Getsinger, K.D.; Freedman, J.E.
Selective control of purple loosestrife with triclopyr.
TECH. REPT. WRP-SM-R, US ARMY CORPS OF ENGINEERS, WATERWAYS EXPT. STATION, WETLANDS RESEARCH PROGRAM, VICKSBURG, MS, 31 PP. 1995.

Niswander, S.F.; Mitsch, W.J.
Functional analysis of a two-year-old created in-stream wetland: hydrology,

phosphorus retention, and vegetation survival and growth.
WETLANDS 15(3):212-225. 1995.

Ostendorp, W.; Iseli, C.; Krauss, M.; Krumscheid-Plankert, P.; et al
Lake shore deterioration, reed management and bank restoration in some central European lakes.
ECOL. ENGINEERING 5(1):51-75. 1995.

Otte, M.L.; Kearns, C.C.; Doyle, M.O.
Accumulation of arsenic and zinc in the rhizosphere of wetland plants.
BULL. ENVIRON. CONTAM. TOXICOL. 55(1):154-161. 1995.

Owen, C.R.
Water budget and flow patterns in an urban wetland.
J. HYDROLOGY 169(1-4):171-187. 1995.

Patil, R.S.; Rao, M.R.; Ramanujam, C.G.K.
Azolla sp. from the Early Cretaceous of Cauvery Basin, South India.
CURRENT SCI. 69(2):97-99 1995.

Patt, J.M.; French, J.C.; Schal, C.; Lech, J.; Hartman, T.G.
The pollination biology of tuckahoe, *Peltandra virginica* (Araceae).
AM. J. BOT. 82(10):1230-1240. 1995.

Pedersen, M.F.
Nitrogen limitation of photosynthesis and growth: comparison across aquatic plant communities in a Danish estuary (Roskilde Fjord).
OPHELIA 41:261-272. 1995.

Pemberton, R.W.
The search for natural enemies of *Trapa*.
PROC., 29TH ANNUAL MEETING, AQUATIC PLANT CONTROL RESEARCH PROGRAM, MISC. PAPER A-95-3, US ARMY CORPS OF ENGINEERS, WATERWAYS EXPER. STATION, VICKSBURG, MS, PP. 154-157. 1995.

Poiani, K.A.; Johnson, W.C.; Kittel, T.G.F.
Sensitivity of a prairie wetland to increased temperature and seasonal precipitation changes.
WATER RES. 31(2):283-293. 1995.

Rattray, M.R.
The relationship between P, Fe, and Mn uptakes by submersed rooted angiosperms.
HYDROBIOLOGIA 308(2):117-120. 1995.

Reichhardt, T.
Academy under fire on 'wetlands' definition.
NATURE 375(6528):171.

Rejmankova, E.; Pope, K.O.; Pohl, M.D.; Rey-Benayasa, J.M.
Freshwater wetland plant communities of northern Belize: implications for paleoecological studies of Maya wetland agriculture.
BIOTROPICA 27(1):28-36. 1995.

Rowley, J.R.; Flynn, J.J.; Takahashi, M.
Atomic force microscope information on pollen exine substructure in *Nuphar*.
BOT. ACTA 108(4):300-308. 1995.

Sajwan, K.S.; Ornes, W.H.
Phytoavailability and bioaccumulation of cadmium in duckweed plants (*Spirodela polyrhiza* L. Schleid).
J. ENVIRON. SCI. HEALTH A29(5):1035-1044. 1994.

Sasser, C.E.; Visser, J.M.; Evers, D.E.; Gosselink, J.G.
The role of environmental variables on interannual variation in species composition and biomass in a subtropical minerotrophic floating marsh.
CAN. J. BOT. 73(3):413-424. 1995.

Sayers, A.; Hamilton, R.G.
The effect of neighbors on gametophyte development in *Ceratopteris richardii*.
AM. FERN J. 85(2):47-53. 1995.

Scherer, N.M.; Gibbons, H.L.; Stoops, K.B.; Muller, M.
Phosphorus loading of an urban lake by bird droppings.
LAKE AND RESERVOIR MANAGE. 11(4):337-342. 1995.

Schuette, J.L.; Klug, M.J.
Evidence for mass flow in flowering individuals of the submersed vascular plant *Myriophyllum heterophyllum*.
PLANT PHYSIOL. 108(3):1251-1258. 1995.

Schwartz, M.F.; Boyd, C.E.
Constructed wetlands for treatment of channel catfish pond effluents.
PROGRESSIVE FISH-CULTURIST 57(4):255-266. 1995.

Segal, D.S.
Relationships between hydric soil indicators and wetland hydrology for sandy soils in Florida.
TECH. REPT. WRP-DE-7, WETLANDS RESEARCH PROGRAM, US ARMY CORPS OF ENGINEERS, WATERWAYS EXPT. STATION, VICKSBURG, MS, 121 PP. 1995.

Shaltout, K.H.; El-Kady, H.F.; Al-Sodany, Y.M.
Vegetation analysis of the Mediterranean region of Nile delta.
VEGETATIO 116:73-83. 1995.

Shamsudin, L.; Sleigh, M.A.
Seasonal changes in composition and biomass of epiphytic algae on the macrophyte *Ranunculus penicillatus* in a chalk stream, with estimates of production, and observations on the epiphytes of *Cladophora glomerata*.
HYDROBIOLOGIA 306(2):85-95. 1995.

Smith, C.S.; Wilson, C.G.
Close to the edge: microhabitat selection by *Neurostrota gunniella* (Busck) (Lepidoptera: Gracillariidae), a biological control agent for *Mimosa pigra* L. in Australia.
J. AUST. ENT. SOC. 34(3):177-180. 1995.

Smits, A.J.M.; Schmitz, G.H.W.; van der Velde, G.; Voesenek, L.A.C.J.
Influence of ethanol and ethylene on the seed germination of three Nymphaeid water plants.
FRESHWATER BIOL. 34:39-46. 1995.

Sorrell, B.K.; Brix, H.; Boone, P.I.
Modelling of *in situ* oxygen transport and aerobic metabolism in the hydrophyte *Eleocharis sphacelata* R. Br.
PROC. ROYAL SOC. EDINBURGH 102B:367-372. 1994.

Spencer, D.F.; Ksander, G.G.
Influence of propagule size, soil fertility, and photoperiod on growth and propagule production by three species of submersed macrophytes.
WETLANDS 15(2):134-140. 1995.

Sprecher, S.L.; Netherland, M.D.
Methods for monitoring herbicide-induced stress in submersed aquatic plants: a review.
MISC. PAPER A-95-1, AQUATIC PLANT CONTROL RESEARCH PROGRAM, US ARMY CORPS OF ENGINEERS, WATERWAYS EXPT. STATION, VICKSBURG, MS, 41 PP. 1995.

Stevens, L.E.; Schmidt, J.C.; Ayers, T.J.; Brown, B.T.
Flow regulation, geomorphology, and Colorado River marsh development in the Grand Canyon, Arizona.
ECOL. APPLICATIONS 5(4).1025-1039. 1995

Stross, R.G.; Sokol, R.C.; Schwarz, A.M.; Howard-Williams, C.
Lake optics and depth limits for photogenesis and photosynthesis in charophyte meadows.
HYDROBIOLOGIA 302(1):11-19. 1995.

Stuckey, R.L.; Moore, D.L.
Return and increase in abundance of aquatic flowering plants in Put-In-Bay

Harbor, Lake Erie, Ohio.
OHIO J. SCI. 95(3):261-266. 1995.

Tabacchi, E.
Structural variability and invasions of pioneer plant communities in riparian habitats of the Middle Adour River (SW France).
CAN. J. BOT. 73(1):33-44. 1994.

Takahashi, M.
Development of structure-less pollen wall in *Ceratophyllum demersum* L. (Ceratophyllaceae).
J. PLANT RES. 108(1090):205-208. 1995.

Takimoto, A.; Kaihara, S.; Yokoyama, M.
Stress-induced factors involved in flower formation in *Lemna*.
PHYSIOL. PLANT. 92(4):624-628. 1994.

Tekle-Haimanot, A.; Doku, E.V.
Comparison of *Azolla mexicana* and N and P fertilization on paddy taro (*Colocasia esculenta*) yield.
TROP. AGRIC. 72(1):70-72. 1995.

Thebtaranonth, C.; Thebtaranonth, Y.; Wanauppathamkul, S.; Yuthavong, Y.
Antimalarial sesquiterpenes from tubers of *Cyperus rotundus*: structure of 10,12-peroxycalamenene, a sesquiterpene endoperoxide.
PHYTOCHEM. 40(1):125-128. 1995.

Thomas, J.D.; Daldorph, P.W.G.
The influence of nutrient and organic enrichment on a community dominated by macrophytes and gastropod molluscs in a eutrophic drainage channel: relevance to snail control and conservation.
J. APPLIED ECOLOGY 31:571-588. 1994.

Thulen, J.S.; Eberts, D.R.
Effects of temperature, stratification, scarification, and seed origin on the germination of *Scirpus acutus* Muhl. seeds for use in constructed wetlands.
WETLANDS 15(3):298-304. 1995.

Valiela, I.; Rietsma, C.S.
Disturbance of salt marsh vegetation by wrack mats in Great Sippewissett Marsh.
OECOLOGIA 102(1):106-112. 1995.

Volkmann-Kohlmeyer, B.; Kohlmeyer, J.
A new Aniptodera (Ascomycotina) from saltmarsh *Juncus*.
BOTANICA MARINA 37:109-114. 1994.

Wangberg, S.A.
Effects of arsenate and copper on the algal communities in polluted lakes in the northern parts of Sweden assayed by PICT (pollution-induced community tolerance).
HYDROBIOLOGIA 306(2):109-124. 1995.

Wicker, A.M.; Endres, K.M.
Relationship between waterfowl and American coot abundance with submersed macrophytic vegetation in Currituck Sound, North Carolina.
ESTUARIES 18(2):428-431. 1995.

Wilcox, D.A.
Wetland and aquatic macrophytes as indicators of anthropogenic hydrologic disturbance.
NATURAL AREAS J. 15(3):240-248. 1995.

Williamson, P.S.; Schneider, E.L.
Floral aspects of *Barclaya* (Nymphaeaceae): pollination, ontogeny and structure.
PL. SYST. EVOL. (SUPPL.) 8:159-173. 1994.

Williges, K.A.; Harris, T.T.
Seed bank dynamics in the Lake Okeechobee marsh ecosystem.
ARCH. HYDROBIOL. SPEC. ISSUES ADVANCES IN LIMNOLOGY 45:79-94. 1995.

Willis, C.; Mitsch, W.J.
Effects of hydrology and nutrients on seedling emergence and biomass of aquatic macrophytes from natural and artificial seed banks.
ECOL. ENGINEERING 4(2):65-76. 1995.

Wunderlin, R.P.; Hansen, B.F.; Delaney, K.R.; Nee, M.; Mullahey, J.J.
Solanum viarum and *S. tampicense* (Solanaceae): two weedy species new to Florida and the United States.
SIDA 15(4):605-611. 1993.

Zakravsky, P.; Hroudova, Z.
The effect of submergence on tuber production and dormancy in two subspecies of *Bolboschoenus maritimus*.
FOLIA GEOBOT. PHYTOTAX., PRAHA 29:217-226. 1994.

Zaranyika, M.F.; Ndapwadza, T.
Uptake of Ni, Zn, Fe, Co, Cr, Pb, Cu and Cd by water hyacinth (*Eichhornia crassipes*) in Mukuvisi and Manyame Rivers, Zimbabwe.
J. ENVIRON. SCI. HEALTH PART A: ENVIRON. SCI. ENGR. 30(1):157-169. 1995.

Zimba, P.V.; Hopson, M.S.; Smith, J.P.; Colle, D.E.; Shireman, J.V.
Chemical composition and distribution of submersed aquatic vegetation in Lake Okeechobee, Florida (1989-1991).
ARCH. HYDROBIOL. SPECIAL ISSUES ADVANCES IN LIMNOLOGY 45:241-246. 1995.

A Small Mediterranean Island Needs Help!

- an appeal from Sylvia Haslam

I work partly in Malta, an island of less than 300km2, with 330,000 people (excluding tourists). What population density! What human impact! Estimates of built-up area now range anything up to a third, and most of the rest is farmed, mainly in small fields (down to c. 20x5m) on often-terraced slopes. What remains? There are karst lands (semi-bare limestones) with garigue (very short woody plants with herbs), there are stream beds, now mostly dried by groundwater extraction. There are odd bits on building sites and by roads, the occasional small copse of maquis (Mediterranean sclerophyll) and little more.

All is now falling apart. Up to the 1960s, most people lived in towns and hardly ever left them. They have since colonised the countryside in a big way, acquiring cars and other attributes of affluence, and, naturally enough, they want country leisure activities. They have no tradition or experience of rural affairs or sustainability. The rural folk, almost a different nation, knew sustainable farming, but many emigrated, and the minority remaining have become too affluent to bother about keeping soil stable, repairing terrace walls, etc., activities once necessary for their survival.

The result poses huge problems. There are still gems of natural and historic heritage in the river valleys and elsewhere, but more of the river valleys is dry, disturbed or both.

Is anyone interested in studying the effect of excessive human impact, as a warning for other places? Including the effects of habitat fragmentation and loss on community, species and gene pools?

There is no money available, so researchers would have to bring their own grants. If coming for long enough, the University Departments of Agriculture and Biology and the (Government) Department of Afforestation and Horticulture welcome visitors. (Afforestation is mostly planting trees in towns.)

There is more here than I can do, and it is a worthwhile cause. Would anyone like to investigate - while there is still something left to investigate? If so, please contact, for further information: Dr. Sylvia Haslam, Department of Plant Sciences, University of Cambridge, England. *Dr. S. Haslam*

Recycling Pesticide Containers

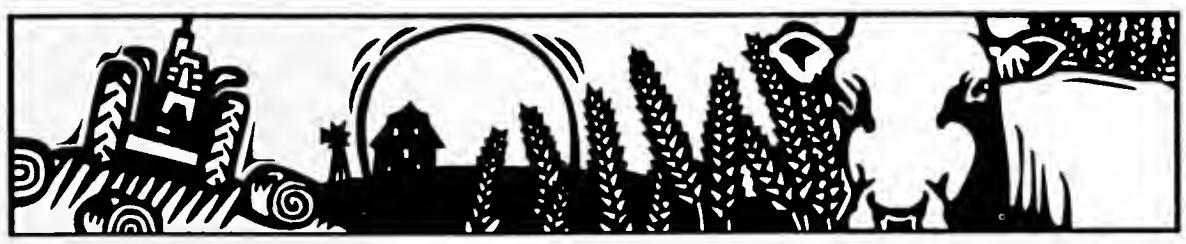
Each year in the United States, more than 35 million "agricultural" pesticide containers (which includes aquatic herbicide containers) are manufactured and distributed. This is more than sixty million pounds of High Density Polyethylene (HDPE) plastic which must be disposed of one way or another.

Rather than take the trouble to burn the empty containers (and pollute the air), or to bury them in a landfill (and pollute the ground), why not recycle them into usable products, such as roofing shingles or faux wooden benches? After all, since 1992 pesticide manufacturers have supported the costs of collecting, grinding up, and recycling used pesticide containers. All that is needed to become part of the manufacturer's container recycling system is people to take responsibility for setting up and maintaining collection sites.

In Florida, more and more counties are setting up "pesticide container recycling collection centers" for the use of farmers, pest control companies, plant nurseries, golf courses, government agencies, and others who typically use pesticides that come in HDPE plastic containers. (This generally excludes homeowners, whose pesticides do not usually come in large bulk containers made of HDPE.)

The effort to set up collection sites in Florida is being coordinated by G. Tim Hurner of the Cooperative Extension Service, under a program being funded by the Florida Department of Environmental Protection. He will provide interested parties with motivational brochures, or will provide complete instructions on how to set up a local pesticide container recycling collection center.

To learn more, contact G. Tim Hurner at UF/IFAS, Florida Pesticide Container Recycling Program, 4509 W. George Blvd., Sebring, FL 33872-5803, (941) 382-2509.



Our Last Word on Balls ...

"In the Hokkaido district of Japan, there is a lake with especially fine *Cladophora* balls which form part of a summer festival connected with the folklore of the local Ainic people. Judging by the issue of a special stamp and a picture postcard [both depicting *Cladophora* balls], "*Cladophora* worship" seems to have become a tourist attraction. Moreover, there is (or was) a bar in Tokyo called Marimba, the Japanese name for these balls, where plastic *Cladophora* balls are on sale. It seems that the mythology surrounding these balls involves a young man and girl who drowned in the lake, their hearts turning into *Cladophora* balls. So popular have *Cladophora* balls become in Japan that they are now protected plants. It is said that plants of other non-ball forming species are rolled by hand into balls and sold as true Marimba."

Excerpt from *Freshwater Algae: their microscopic world explored*, by Hilda Canter-Lund and John W.G. Lund (see review on page 8).

Institute of Food and Agricultural Sciences
AQUATIC PLANT INFORMATION RETRIEVAL SYSTEM (APIRS)
Center for Aquatic Plants
University of Florida
7922 N.W. 71st Street
Gainesville, Florida 32653 USA
(352) 392-1799

Address Correction Requested

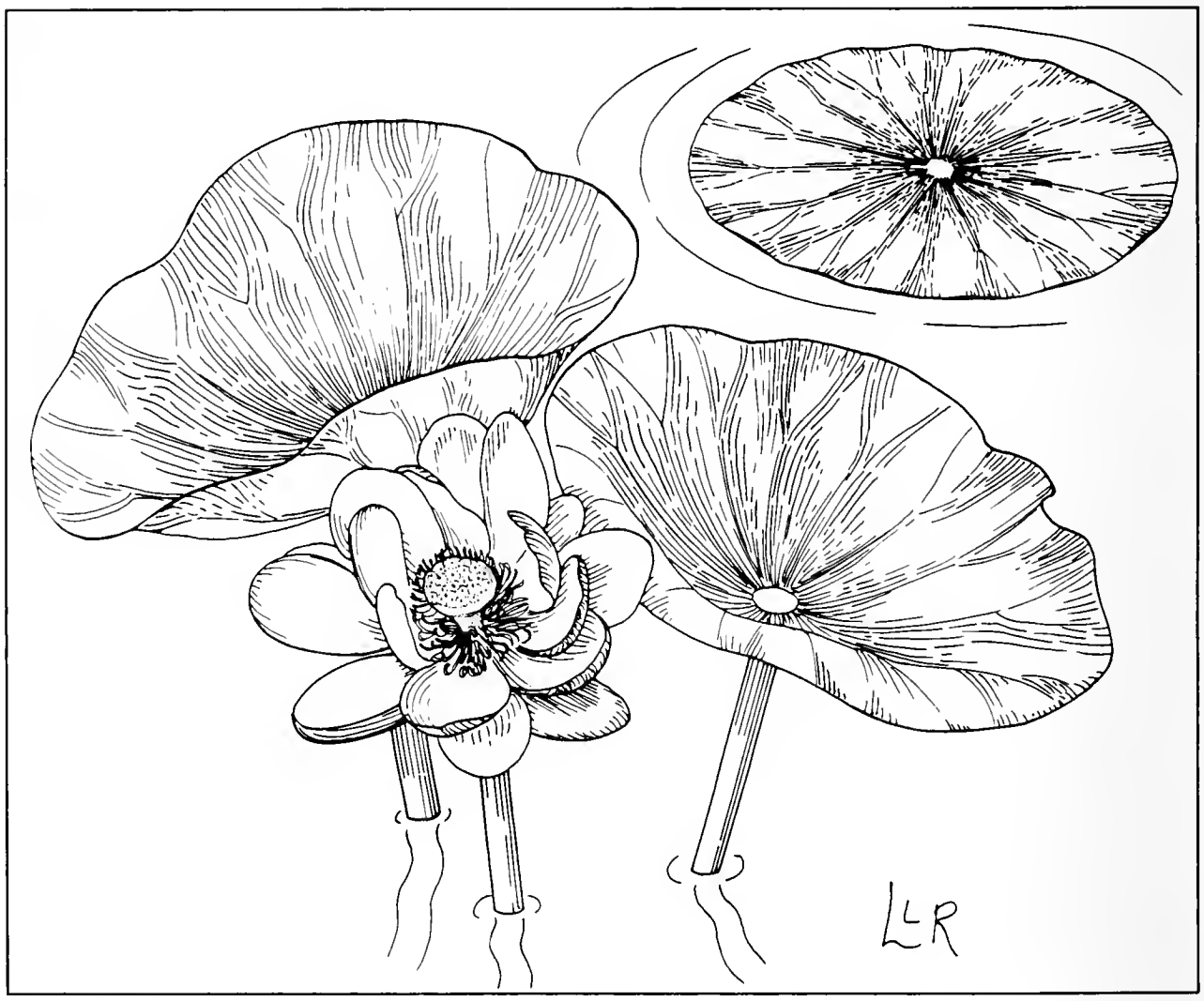
AQUAPHYTE

This is the newsletter of the Center for Aquatic Plants and the Aquatic Plant Information Retrieval System (**APIRS**) of the University of Florida Institute of Food and Agricultural Sciences (IFAS). Support for the information system is provided by the Florida Department of Environmental Protection, the U.S. Army Corps of Engineers Waterways Experiment Station Aquatic Plant Control Research Program (APCRP), the St. Johns River Water Management District and UF/IFAS.

EDITORS: Victor Ramey
Karen Brown

AQUAPHYTE is sent to more than 5,500 managers, researchers and agencies in 87 countries. Comments, announcements, news items and other information relevant to aquatic plant research are solicited.

Inclusion in *AQUAPHYTE* does not constitute endorsement, nor does exclusion represent criticism, of any item, organization, individual, or institution by the University of Florida.



"The Lotus beds of the Monroe marshes [Lake Erie] were for a great many years an advertising feature of Monroe to attract tourists and visitors to that city. These have practically disappeared since Michigan put the muskrat under game protection. The rats devoured the rhizomes for food and thus destroyed one of Monroe's flourishing activities. The plants flowered by the thousands every year and visitors were taken out to the beds and allowed to cut the flowers at will and carry them away. I am putting it rather mildly when I say that in the forty years I was at Detroit I probably saw a million such flowers." *Excerpt from O.A. Farwell, The Color of the Flowers of Nelumbo pentapetala, Rhodora 38:272. 1934. (Now recognized as Nelumbo lutea.)* Note: Dr. Edward Voss at the University of Michigan Herbarium reports that *Nelumbo lutea* still occurs in the area described by Farwell.

A Q U A P H Y T E

Center for Aquatic Plants
with support from
The Florida Department of Environmental Protection,
Bureau of Aquatic Plant Management
The U.S. Army Corps of Engineers,
Waterways Experiment Station,
Aquatic Plant Control Research Program

UNIVERSITY OF FLORIDA
Institute of Food and Agricultural Sciences

Volume 16 Number 2 Winter 1996 **Gainesville, Florida** **ISSN 0893-7702**

You Have Been Deleted!

As of this issue, *EVERYBODY* on the **AQUAPHYTE** mailing list has been deleted, whether this is your first issue or your thirtieth. (Regular purging of our mailing lists is required by the government.)

If you want to continue receiving the printed version of **AQUAPHYTE**, *you must contact us in writing*, through regular mail or via E-mail, verifying your name and mailing address. **Please see pages 14 and 15.**

There *is* an alternative. You do not have to re-subscribe to the printed version of **AQUAPHYTE** and can simply read (and print, if you want to) the online version of this newsletter. In fact, we would *prefer* that you read it online rather than expect an expensive printed version delivered by mail. Online **AQUAPHYTE** is accessible through the APIRS Internet Web site at **http://aquat1.ifas.ufl.edu/**

Environmental Professionals To Be Licensed?

Should "environmental professionals" be regulated and licensed by the state in the same way that other professionals are, such as engineers, surveyors, geologists and bankers? The Florida Association of Environmental Professionals, the Florida Lake Management Society, and other organizations think so. They have formed a coalition to file a bill with the Florida Legislature for consideration in its spring 1997 session. Four years in the writing, the bill would require anyone who wants to "practice environmental management" (make ecological predictions or environmental determinations) to have a license, or to work under the guidance of someone who does. Owners and managers of private companies that offer environmental services in the state would be affected. Government workers in general would be exempted, "provided their work is reviewed and/or prepared under the supervision of a licensed environmental professional". The management of agricultural and aquacultural resources are exempt.

According to the bill, a licensee must provide proof of "having earned a four-year college degree in one of the environmental managment sciences", "having completed a minimum of 5 accumulative years of experience" and "having met the continuing education requirements." A "grandfather clause" is included in the bill, which allows some applicants to substitute experience for a degree in environmental management.

Licensure is a good idea, according to Dr. Tom Cuba, because the general public needs more assurance that reliable ecological decisions are made and that environmental professionals are more liable for their actions; and because there is "too much tax money wasted" on and environmental damage caused by bad environmental management advice

[See Professionals on Page 2]

A View on Melaleuca...from Down Under

by Tim Low, Queensland, Australia

Very few Australians realise that our paperbark tea tree (*Melaleuca quinquenervia*) has become a weed in Florida. In Australia, it is a well known tree often planted in parks. It is also an important source of honey to beekeepers, and the bark is sometimes gathered to line plant pots, and to make bark "paintings".

The paperbark is a very successful tree in temperate eastern Australia. In pre-European times it formed vast forests on coastal swampy land. It replaces eucalypts on seasonally-inundated alluvial soil, forming monotypic forests or woodlands. It also grows within swamps and along the banks of streams in the lower reaches of catchments.

Paperbark forests are not a diverse habitat. Often there are no other tree species present. Where the ground is slightly elevated, eucalypts grow as emergents, especially the forest red gum (*Eucalyptus tereticornis*), and also the swamp mahogany (*Lophostemon suaveolens*). Where the soil becomes saline, paperbarks are replaced by swamp oak (*Casuarina glauca*).

In paperbark forests, the ground cover is usually blady grass (*Imperata cylindrica*). This grass is very widely distributed in Australia, Asia, and Africa, and it has spread to the United States to become a serious weed. Very few shrubs grow within paperbark forests, and only one vine is common, strawpod (*Parsonia straminea*).

[See View on Page 10]

APIRS Update

To Download Search Results From The APIRS Database

These are instructions as to how remote users can download search results from the APIRS database. First, be sure to follow the new "log on" instructions to be found on the database page of our Web site:
http://aquat1.ifas.ufl.edu/database.html

Here is the solution for downloading to your computer the results of a database search. (This would be much easier if APIRS could afford a $17,000 software interface, but this works.) For example, suppose you did the following search, and you want the results at your computer so that you can print them out on your printer.

At the search screen, suppose your search was: **eichhornia$ and (biogas$ or methan$)**
The number of "hits" for this query comes to 170 documents, and you want to look at them at your leisure. For demonstration purposes, let's call this printout "biogas".

1) You have completed your search of the database, and you are at a blank "Enter search request [Options]" line. Press **<return>**. Also press **<return>** after each of the following actions.
2) You are at the "Options" screen. Choose "**R**" to "Redirect documents".
3) The full pathname to type here will be: **/usr/guest/biogas**
(Note the direction of the "/"--make sure it's right.)
4) Enter your selection [F]: **f**
5) Enter documents for redirect: **all**
6) Press **<return>** when prompted.
7) You are back at the search screen. Follow instructions to **log off** (and **quit** the database).
8) Quit your telnet program (your "terminal session").
9) Start your FTP program.
10) Using FTP commands, you will **transfer your search file** (in this example, "biogas") from the database computer to your computer.

FTP programs are different; some require FTP commmands, some use easy menu choices.
For those that require FTP commands:
11) At "ftp" prompt, type: **ftp aquat1.ifas.ufl.edu** (Note that there is a single space between "ftp" and "aquat1")
12) At user, type: **guest**
13) At password, type: **datalist2**
14) At "ftp" prompt, type:
get /usr/guest/biogas c:\mydirectory\biogas (Note that 1) there is a single space between "get" and "/usr..."and between "biogas" and "c:\my...", and 2) "mydirectory" is the name of the directory on your computer where you want the search file to go.)
15) After transfer, at "ftp" prompt, type: **bye**
16) Quit FTP
17) Start word processor; **load** "biogas" file. (You may have to convert the file to ASCII (DOS) Text or some other compatible format for your word processing program.)

[Professionals, from Page 1]

and activities. Cuba is the Executive Director of the Environmental Professionals Action Coalition, a lobbying organization that has been shepherding the bill.

As of now, according to Cuba, only British Columbia requires licensing of its environmental professionals. However, five states are monitoring the progress of Florida's bill. "I am very optimistic that it will pass this spring," says Cuba. He is interested in comments and suggestions: **Dr Tom Cuba, Delta Seven, Box 54697, St. Petersburg, FL 33739 (813/532-0709).**

V.R.

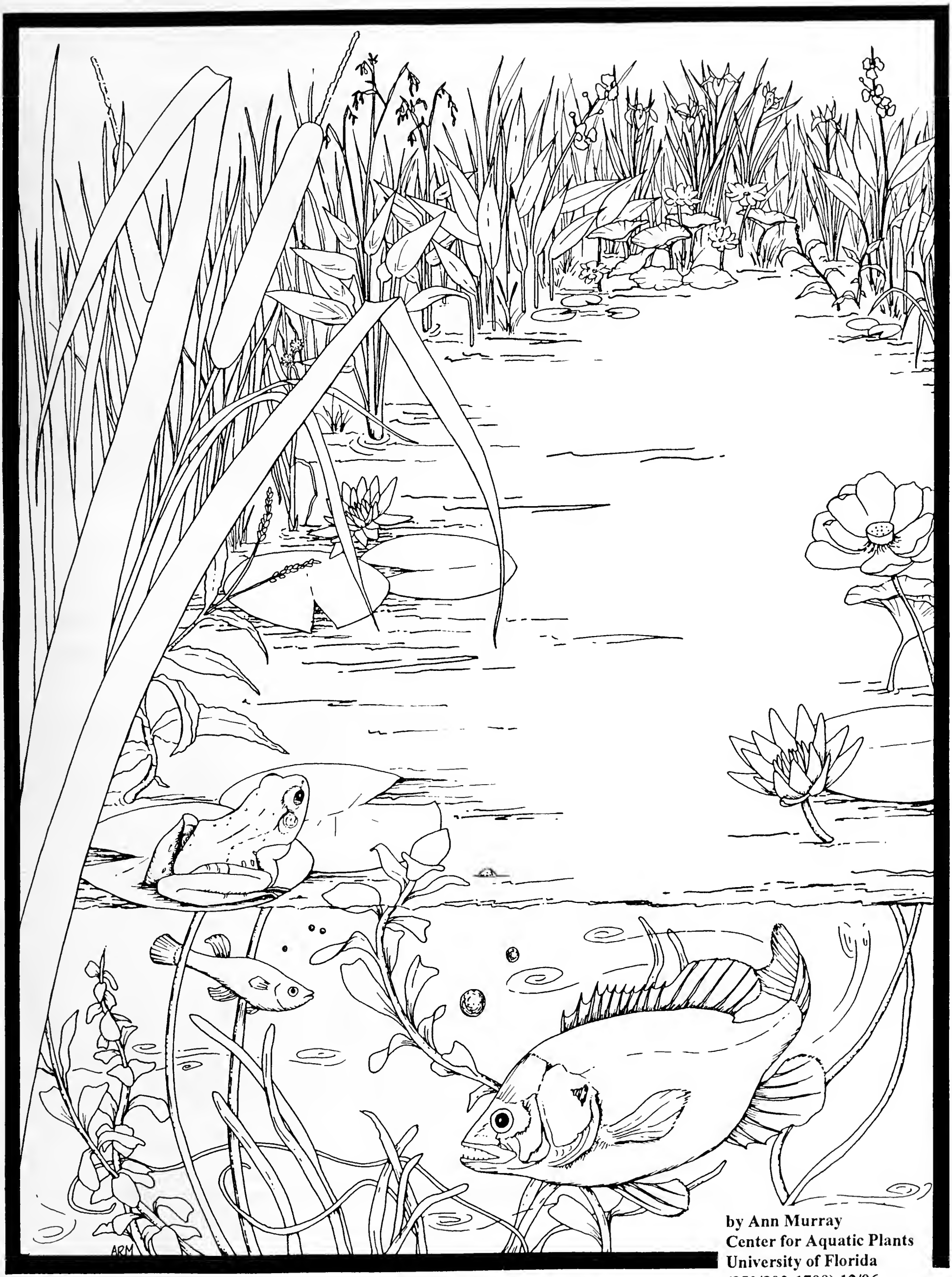
We are looking for plant material to draw!

If you have an aquatic or wetland plant specimen that you need a botanically accurate drawing of, please send it to APIRS. We will make the drawing, send you a free reproduction of it, and include the drawing in our line-drawings package. (See page 13 for a list of plants already drawn.)

Please contact Vic Ramey at APIRS for more information: varamey@nervm.nerdc.ufl.edu or 352/392-1799.

Coloring Page

This drawing of a Florida scene by Ann Murray is ready to color. Simply tear out or photocopy the page. Give it to some children, or keep it yourself, and color it. Send the colored pictures to APIRS and we will display them on our Web site for all to enjoy. Plants depicted include cattail (*Typha*), fire flag (*Thalia*), duck potato (*Sagittaria*), lotus (*Nelumbo*), water lily (*Nymphaea*), red ludwigia (*Ludwigia*), blue flag (*Iris*), smartweed (*Polygonum*), bur reed (*Sparganium*), and tape grass (*Vallisneria*).



by Ann Murray
Center for Aquatic Plants
University of Florida
(352/392-1799) 12/96

4-H Wetlands Programs

St. Lucie County 4-H realizes the importance of Florida's wetlands. A wetlands 4-H school enrichment program was developed by 4-H Agriculture Agent Susan Munyan and 4-H Program Assistant Debbie McNeill to bring appreciation and understanding of our wetlands to students. In the classroom, 4th and 5th grade students learn what a wetland is, some of the different forms of wetlands, and typical wetland plants and animals.

Fourth grade student identifying bog buttons.

The program is concluded with a wetlands field trip that tests their classroom studies. Students visit several natural and man-made wetlands. Using the University of Florida produced "Aquatic Plant Identification Deck", teams of students are asked to identify plants and signs of wildlife found in the wetlands. This team approach encourages students to collectively use their wetlands knowledge.

Through classroom and hands-on experience, 795 students are to be an interactive part of the St. Lucie County 4-H wetlands program. These students will be able to determine a wetland by the plants and animals found. Students also begin to understand the significance of Florida's wetlands to the environment.

APROPOS - the aquatic plant management strategy planner is under development by the U.S. Army Corps of Engineers and needs "beta testers". This is "a computer -assisted tool to help the aquatic plant manager integrate all the information available for developing management plans." The main menu will allow the user to access a planner, as well as literature databases, simulation tools, field techniques toolbox, control technique toolbox, database menu, and, of course, a "help menu". If you are interested in testing and commenting on APROPOS, contact John Madsen (E-mail: madsenj@ex1.wes.army.mil; (214/436-2215)) or Bob Gunkel (E-mail: gunkelr@ex1.wes.army.mil; (601/634-3722)).

HANDBOOK NEEDS AUTHORS - *The Handbook of Aquatic and Wetland Plants of the Caribbean and Bahamas Islands* is being coordinated by Drs. Rodulio Caudales and Efren Vega of the University of Botswana. They have put out a request for scientists interested in writing sections on various families of plants. For more information, contact Dr. Rodulio Caudales, University of Botswana, Private Bag 0022, Gaborone, BOTSWANA; E-mail: caudales@noka.ub.bw

Aquatic Exotic News

Hydrilla in Connecticut

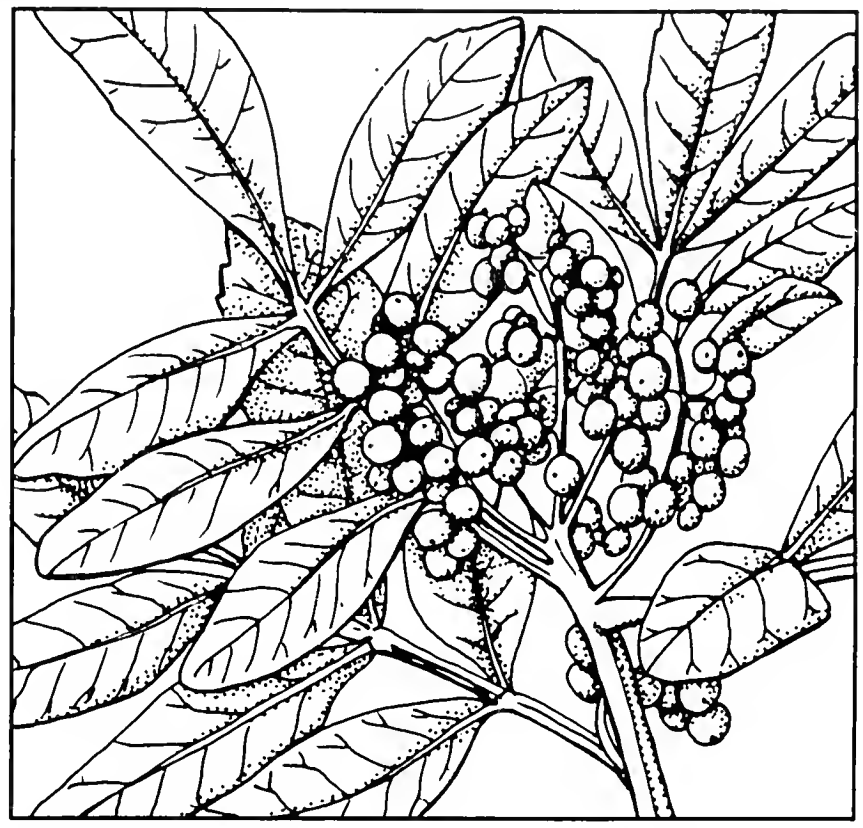
The Fall 1996 issue of *Aquatic Exotics News* includes an account of the spread of *Hydrilla verticillata* into New England. Prof. Donald Les discovered the federally prohibited plant densely grown to the surface in a Connecticut pond. Les was lead to the site when he happened to recognize an error in a herbarium record: what Les recognized as *Hydrilla* had been misidentified by the herbarium in 1989 as *Egeria densa.* Thus, hydrilla was introduced to Connecticut at least seven years ago.

Aquatic Exotics News is the newsletter of the Northeast (USA) Sea Grant Network at the University of Connecticut at Avery Point. Ms. Nancy Balcom edits the 4-8 page newsletter, and it is published twice a year. The latest issue included the report cited above, as well as a zebra mussel update from Vermont; a notice about the "storm drain stencil program" in Connecticut and purple loosestrife publications; and information about upcoming lake management meetings.

For information on subscribing to *Aquatic Exotics News*, contact Nancy Balcom, Connecticut Sea Grant Marine Advisory Program, University of Connecticut, 1084 Shennecossett Rd., Groton, CT 06340-6097. *Aquatic Exotics News* and other information from the Connecticut Sea Grant Program also may be accessed on the World Wide Web at: http://www.ucc.uconn.edu/~wwwsgo

Prohibited Aquatic Plants - Out and About?

In an effort to not curtail the sale of commercially valuable plant species, the Florida Department of Environmental Protection, Bureau of Aquatic Plant Management, is revising its Florida Administrative Code, Rule 62C52 on Aquatic Plant Importation, Transportation, Non-Nursery Cultivation, Possession and Collection, to allow the sale of prohibited aquatic plant material proven to be non-viable. Commercial uses for prohibited plants include selling the bright red berries of Brazilian pepper, *Schinus terebinthifolius*, as ornamentals at Christmas. The berries are sterilised using heat and methyl bromide fumigation treatments. The new rule will allow permits for the collection, transportation and sale of the berries providing collection and transportation methods are secure against accidental dispersal and the plant material is proven to be sterile.



Schinus terebinthifolius

The rule change was considered partly in response to complaints from commercial growers and members of Florida's Asian community who have shown a strong desire to grow water spinach, *Ipomoea aquatica*. Water spinach is widely grown and eaten as a vegetable in Vietnam and other areas in Asia. It repeatedly has been found growing illegally in Florida waterbodies and commercial nurseries, and being sold in Asian food markets. Growers in Hillsborough County signed a legal consent order agreeing to destroy their crops if inspectors could obtain a positive identification of the plant by a third party. Dr. Dan Austin, a botanist with the University of South Florida, grew plant samples to the flowering stage and verified that they were indeed *Ipomoea aquatica*. Under the new rule, permit applications would be evaluated based on the demonstrated non-viability of the plant material. Research is now underway at the University of Florida, Fort Lauderdale Research and Education Center, on methods of rendering *Ipomoea aquatica* non-viable, possibly using irradiation. If this is accomplished to the satisfaction of DEP, growers may begin cultivating water spinach under quarantine conditions.

Another product which so far has been allowed is the sale of *Hydrilla verticillata* in powdered, capsuled form. (In Florida, the powdered material is made from hydrilla which has been mechanically harvested and left on the banks of Lake Seminole, so the plant is not being cultivated.) The product is billed as "100% Hydrilla, a unique, 'wild harvested' freshwater herb, the most recently discovered antioxidant, phytonutrient, complex enzyme, whole food concentrate, a muscle builder, energy enhancer, nutrient provider, anti-arthritic, free radical scavenger, with applications for stress management, skin disorders and age associated diseases..." The product's purveyors also claim that hydrilla "helps control toxic reactions caused by drugs and chemical exposures from our diet and environment."

Meanwhile, hydrilla is the number one aquatic weed problem in the state of Florida, with approximately 13 million dollars allocated for its control during the 1996-1997 fiscal year. Ninety capsules retail for about $36.00. Step right up, folks!

K.B.

An aquatic plant manager equipped with backpack sprayer wades through waste deep water infested with water spinach, *Ipomoea aquatica*. The infestation was found in Alligator Lake in Pinellas County, Florida.
Photograph provided by Mr. Rob Kipker, Florida Department of Environmental Protection.

Florida bills and legislation may be viewed on the WWW. For bills prefiled for the 1997 session, substitute "1997" for "1996".
House: http://www.scri.fsu.edu/fla-leg/bill-info/1996/house_index.html **Senate:** http://www.scri.fsu.edu/fla-leg/bill-info/1996/senate_index.html

Participants from the 1996 International Workshop and 8th Macrophyte Group Meeting - International Association on Danube Research, on Lake Bohinj, Slovenia. The proceedings were contributed to the *APIRS* collection by Olga Urbanc Berčič and Alenka Gaberščik.

APIRS Seeks Proceedings

The Aquatic Plant Information Retrieval System (*APIRS*) collects literature of all sorts for inclusion in the database. This includes "proceedings" from relevant meetings held throughout the world. 'Grey' literature of this type is particularly difficult to locate for researchers, students and others, especially after several years.

To archive the proceedings from your meeting and to make them available to others throughout the world, please send them to *APIRS*. They will be cataloged for inclusion in the database and housed with our permanent collection of aquatic and wetland plant literature, a collection of more than 43,000 items.

Meetings

INTECOL VII INTERNATIONAL CONGRESS OF ECOLOGY. July 19-25, 1998. Florence, Italy.

Organized by the International Association for Ecology (INTECOL) in conjunction with the Italian Ecological Society (SltE), the motto of this congress is *New Tasks for Ecologists after Rio 1992*. It is an invitation to all ecologists to come together to examine the relationships of human activities and the environment in both scientific and social dimensions.

Contact: Almo Farina, Secretariat VII International Congress of Ecology, c/o Lunigiana Museum of Natural History, Fortezza della Brunella, 54011 AULLA, Italy; WWW: http://www.tamnet.it/intecol.98

WORKSHOPS--WORKING WITH WETLANDS AND WILDLIFE. January 28-29, 1997, Houston, Texas. February 25-26, 1997, Atlanta, Georgia.

These two day workshops are to "demonstrate the most effective and efficient means of planning and implementing wetlands restoration, creation, and management projects, and to promote pro-active management of wetlands for maximum benefits." The workshops are sponsored by the Wildlife Habitat Council in cooperation with the US EPA, the US Army Corps of Engineers, the USDA Natural Resources Conservation Service, the Tennessee Valley Authority, the US Fish & Wildlife Service and Svoboda Ecological Resources.

Contact: Wildlife Habitat Council, 1010 Wayne Avenue, Suite 920, Silver Spring, MD 20910; telephone: 301/588-8994; fax: 301/588-4629; E-mail: whc@cais.com; WWW: http://www.wildlifehc.org/wildlifehc

SECOND NORTHEAST CONFERENCE ON NON-INDIGENOUS AQUATIC NUISANCE SPECIES. February 7-8, 1997. Burlington, Vermont.

Connecticut Sea Grant, University of Connecticut, and the Vermont Department of Environmental Conservation are sponsoring a two-day conference to discuss current research on non-indigenous aquatic species in the northeastern United States.

Contact: Nancy Balcom, Sea Grant Marine Advisory Program, 1084 Shennecossett Rd., Groton, CT 06340; telephone: 860/405-9127

VIII INTERNATIONAL CONFERENCE ON HARMFUL ALGAE. June 25-29, 1997. Vigo, Spain.

Contact: Beatriz Reguera, Conference Coordinator, Instituto Espanol de Oceanografia, Apartado 1552, 36280 Vigo, Spain.

1997 RESEARCH REVIEW AND AQUATIC PLANT MANAGERS WORKSHOP. March 11-12, 1997. Gainesville, Florida.

Recently completed and current research being conducted on aquatic plant management throughout Florida will be presented, together with an assessment of the future of aquatic plant management.

Contact: Office of Conferences, University of Florida, IFAS, telephone: 352/392-5930; E-mail: conf@gnv.ifas.ufl.edu

22ND ANNUAL CONFERENCE OF THE NATIONAL ASSOCIATION OF ENVIRONMENTAL PROFESSIONALS. May 19-23, 1997. Orlando, Florida.

A combination technical conference and trade show, which addresses local, national and international environmental issues associated with government, industry, small business, sustainable development, stakeholder involvement, NEPA, and risk management. Held in conjunction with Environmental Resource EXPO '97, billed as the largest environmental industry trade show in the Southeast.

Contact: Helen Merkel, Horne Engineering and Environmental Services, 4501 Ford Ave., Suite 1100, Alexandria, VA 22302.

SECOND INTERNATIONAL SYMPOSIUM ON ENVIRONMENTAL SOFTWARE SYSTEMS. April 26 - May 3, 1997, Whistler, British Columbia, Canada

Organized by the International Federation for Information Processing and the German Computer Society. The symposium will include course lectures for students and faculty on *Tools for Environmental Informatics*, with advanced credit provided at several institutions. The theme of the course is environmental data management and environmental information systems to bridge gaps in time and space in data, information and knowledge. Participating universities are University of Waterloo, University of Guelph, Hochschule fuer Technik und Wirtschaft des Saarlandes, and Fachhochschule Nuertingen.

Contact: Dr. David Swayne, Department of Computing & Information Science, University of Guelph, Guelph, Ontario, Canada N1G 2W1; Fax: 519/837-0323; E-mail: dswayne@snowhite.cis.uoguelph.ca

ANNUAL CONFERENCE ON ECOSYSTEMS RESTORATION & CREATION. May 15-16, 1997. Tampa, Florida.

Sponsored by the Hillsborough Community College Institute of Florida Studies. The conference will provide a forum for the nationwide exchange of scientific research in the restoration, creation and management of total ecosystems including freshwater and coastal wetlands and upland and transitional areas.

Contact: Frederick Webb, Hillsborough Community College, Institute of Florida Studies, Plant City Campus, 1206 N. Park Road, Plant City, FL 33566; telephone: 813/757-2104; E-mail: webb@mail.hcc.cc.fl.us

AQUATIC WEED SHORT COURSE. May 12-15, 1997. Fort Lauderdale, Florida.

Sponsored by the University of Florida, Institute of Food and Agricultural Sciences (IFAS). The course will offer continuing education units for Pesticide Applicator Certification in categories including Aquatic, Right-of-Way, Aerial, Ornamental and Turf, CORE, Demonstration & Research, and Regulatory.

Contact: University of Florida, IFAS, Office of Conferences, telephone: 352/392-5930

18TH ANNUAL MEETING OF THE SOCIETY OF WETLAND SCIENTISTS. June 1-6, 1997. Bozeman, Montana.

The technical program will focus on the wetland functions and management theme of the meeting, *Wetlands Heritage and Stewardship*. Several field trips are planned.

Contact: Montana State University, Conference Services, Room 280F, Strand Union, Bozeman, MT 59717-0402; fax: 406/994-3228. To submit abstracts: Paul Hook, Dept. Animal & Range Sciences, Montana State University, Bozeman, MT 59717-2900; telephone: 406/994-3724; E-mail: bozeman97@sws.org; WWW: http://www.sws.org

COMMUNITIES WORKING FOR WETLANDS. May 7-9, 1997. Alexandria, Virginia.

Billed as an *American Wetlands Month Celebration*, the meeting will be a gathering of people interested and sharing experiences in community-based wetlands conservation.

Contact: *Communities Working for Wetlands*, c/o Terrene Institute, 4 Herbert St., Alexandria, VA 22305; telephone: 800/726-4853; fax: 703/548-6299; E-mail: terrene@gnn.com

EIGHTH ANNUAL MEETING OF THE FLORIDA LAKE MANAGEMENT SOCIETY. May 7-9, 1997. West Palm Beach, Florida.

The conference theme is "*New Perspectives and Tools for Lake and Watershed Management*".

Contact: Chuck Hanlon, Conference Chairman, South Florida Water Management District, P.O. Box 24680, West Palm Beach, FL 33416-4680; telephone: 561/687-6748; E-mail: charles.hanlon@sfwmd.gov

Books/Reports

EUTROPHICATION OF LAKES IN CHINA- A Gift To The 4th International Conference on the Conservation and Management of Lakes, "Hangzhou '90", edited by J. Xiangcan, L. Hongliang, T. Qingying, Z. Zongshe and Z. Xuan. 1990. 652 pp. (In English.)

(Order from Prof. Jin Xiangcan, Water Environmental Institue of the Chinese Research Academy of Environmental Sciences, Beiyuan, Beijing, 100012, CHINA. US$150.00.)

Ecologists and limnologists of the Chinese Academy of Science have compiled a very large amount of research, graphs and maps about the status of the highly diverse lakes (and reservoirs) of China in a well-produced, very well-written book. There are no other such resources about the lakes of China in the APIRS library.

In two parts, this tome is 1) "a comprehensive introduction to the lakes' environmental characteristics" and 2) a review and compilation of dozens of eutrophication studies by many Chinese scientists. Part One includes information on all conceivable characteristics from sediment granularity to the effects of tourists to the distributions of indicator species. Part Two (the remaining 500 pages) presents the trophic states of five regions of China, as well as separate reviews of urban lakes and reservoirs.

There are no indexes or appendixes.

PONDWEEDS OF GREAT BRITAIN AND IRELAND - B.S.B.I. Handbook No. 8, by C.D. Preston. 1995. 352 pp.

(Order from the Botanical Society of the British Isles, Publications, Green Acre, Wood Lane, Oundle, Peterborough PE8 5TP, GREAT BRITAIN. (Tel. 01832 273388))

This book is "intended as an identification guide rather than a taxonomic monograph" for those who are "reasonably familiar" with botany. The first third is an introduction to the biology of *Potamogeton* species in the British Isles, and includes chapters on prehistory, nomenclature, classification, evolution, hybridisation, structure, life history, habitats, distribution, and collection and preservation.

The second part of the book presents two keys to 50 species (including a couple of *Ruppias* and *Groenlandia densa*). Each species is treated by descriptions, maps and excellent line drawings.

RESERVOIR FISHERIES OF INDIA, by V.V. Sugunan. 1995. 423 pp. (In English.)

(Order from Food and Agriculture Organization (FAO) of the United Nations, Publications Division, Viale delle Terme di Caracalla, 00100 Rome, ITALY. FAO Fisheries Technical Paper No. 345.)

The per capita availability of fish in India is 3.2 kg while the world average is 12.1 kg. To increase inland fish production will require using Indian reservoirs, about which documentation is "grossly inadequate." This research literature review will provide "a baseline" to "assess the potential for culture-based fisheries enhancement of reservoirs in the region."

The book begins with a national perspective on inland fisheries in India, as well as maps and charts of reservoir distribution, soils, and climate. The remaining 13 chapters present the facts and figures from each state, including stocking methods and rates, yields, and water chemistry.

DICTIONARY OF PLANT NAMES, In Latin, German, English and French, by H. Nikolov. 1996. 926 pp. ISBN 3-443-50019-6

(Order from J. Cramer, Gebruder Borntraeger, Johannesstr. 3A, D-70176 Stuttgart, GERMANY. (Tel. 0711/625001.) US$128.00.)

This books lists 14,500 generic names and as many species and 1,600 synonyms, for about 600 families of plants, bacteria included.

ECOLOGY AND MANAGEMENT OF TIDAL MARSHES - A Model from the Gulf of Mexico, edited by C.L. Coultas and Y.-P. Hsieh. 1997. 352 pp. ISBN 1-57444-026-8

(Order from St Lucie Press, 100 E Linton Blvd., Suite 403B, Delray Beach, FL 33483. (407/274-9906.) US$59.95 plus S/H.)

This book introduces the reader to the highly productive intertidal salt marshes of Florida's Gulf of Mexico coast. Florida has more intertidal wetlands than Georgia and the Carolinas combined. It is illustrated with charts, graphs and ok-quality black-and-white photographs.

Included are 12 review chapters on various aspects of intertidal marshes, such as functions, geology, soils, vegetation, primary productivity and animals. The chapter on legal protection was written by lawyers, and the one on management was written by specialists of the Florida Department of Environmental Protection.

This book also includes chapters on how "to value" wetlands and the things that live in them. Chapter 8, written by Professors H.T. Odum and D.A. Hornbeck, is a tutorial on how to use Odum's highly-complex "EMERGY measure" (named in 1983) to "estimate the contributions of marsh production and storage to real wealth"; that is to say, to calculate the monetary value of marshes. Using EMERGY, Odum and Hornbeck calculate that marshes around Cedar Key, Florida, contribute to the "potential for growth" of the town to the tune of $55.3 million (1990 $). Therefore, the "potential public value that depends on marshes is $5,839/ha/year (1990 $)."

Appendixes that list the terrestrial vertebrates and aquatic insects of Florida's Gulf coast tidal marshes complete this compendium.

WILDLIFE COMMUNITY HABITAT EVALUATION: A MODEL FOR DECIDUOUS PALUSTRINE FORESTED WETLANDS IN MARYLAND - Final Report, by R.L. Schroeder. 1996. 42 pp.

(Order from National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161. Technical Report WRP-DE-14. Final Report from the US National Biological Service to the US Army Corps of Engineers.)

This publication is a description of and tutorial for the use of the "Habitat Model", a mathematical procedure that "predicts [species] richness from an evaluation of habitat and spatial variables, with the highest levels of richness assumed to be found in mature, unfragmented forested wetland tracts."

AQUATIC AND WETLAND PLANTS OF SOUTH CAROLINA, by C.A. Aulbach-Smith and S.J. de Kozlowski. Second Edition. 1996. 128 pp. (Order from K. Horan, SCDNR, Water Resources Division, 1201 Main Street, Suite 1100, Columbia, SC 29201, (803/737-0800.) $15.00.)

This expanded version of the 1990 edition includes treatments for more than 120 species. It is a well-made book profusely illustrated with exceptional (though smallish) color photographs and line drawings. This manual does not include a key to the species, though the book is divided into sections: submersed; floating; shoreline and wetland; grasses, sedges and rushes; and algae.

ATLAS OF GRACILARIA SPORE CULTURE, by E.P. Glenn, D.W. Moore, C.Y. Machado, K.M. Fitzsimmons and S.E. Menke. 1996. 33 pp. (Order from Environmental Research Laboratory, University of Arizona, 2601 E Airport DR, Tucson, AZ 85706 (520/741-1990.)

This publication resembles a ready-made "business plan" for starting the business of seaweed aquaculture. The spiral-bound manual explains how to prepare and operate a spore culture facility, in which *Gracilaria* (a red seaweed) is grown and harvested. *Gracilaria* is consumed around the world where it is the raw material for gel agar and other foodstuffs. Its increasing demand is not being met by the industry's depleting natural sources in the seas of Asia and South America; aquacultural sources must be expanded.

In many large, very good black-and-white photographs, the *Gracilaria* life cycle and its aquaculture are depicted. Chapters also explain how to collect data and keep records, and presents the "Moloka'i experience" in Hawaii, including listing installation and operating costs, with depreciation schedule and 5-year-cash-flow estimates.

FLORIDA FRESHWATER PLANTS - A Handbook of Common Aquatic Plants in Florida Lakes, by M.V. Hoyer, D.E. Canfield, C.A. Horsburgh, and K.P. Brown. 1996. 264 pp.
(Order from University of Florida, IFAS Publications, PO Box 110011, Gainesville, FL 32611-0011. (352/392-1764.) US$35.00 plus S/H.)

The objective of this uniquely informative handbook is to examine the relation of water chemistry to the presence and distribution of 103 common aquatic plants in 322 Florida lakes.

The book presents color photographs, descriptions, Florida distribution and biology of each plant. It also includes tables of data and succinct interpretations which describe the ranges of water chemistry variables for the individual species. These data were taken from 15 years of research conducted on Florida lakes. In addition, a list of scientific references selected from the Aquatic Plant Information Retrieval System (APIRS) database refers users to other sources of published information for each species.

Also included in this fact-filled volume are statistical tables showing plants sorted for water chemistry variables including pH, alkalinity, conductance, color, phosphorus, nitrogen, chlorophyll a, Secchi depth, calcium, magnesium, sodium, potassium, sulfate, chloride, iron and silicon.

AQUATIC AND WETLAND PLANTS OF INDIA, by C.D.K. Cook. 1996. 385 pp. ISBN 0-19-854821-4 (Order from Oxford University Press. 198 Madison Avenue, New York, NY 10016. $165.00 plus S/H.)

This "Flora", Prof. Cook's "last fling before going into retirement", is a much-needed record of the diversity of aquatic and wetland plants in the subcontinent, as well as a much-needed identification manual that was written to be used by students and others having little botanical training.

The identification key is based on easily seen vegetative characteristics, so that taxa may appear several times in the key. Thus, users may depend on different characteristics and follow different ("easier") paths in the key to identify a plant in question. Each species is described, its distribution in India is noted, and an "ecological diagnosis" is presented. Only Latin names are used in this Flora. The illustrations are line drawings, of which there are relatively few.

WETLAND PLANTS OF OREGON AND WASHINGTON by B.J. Guard. 1995. 239 pp. ISBN 1-55105-060-9
(Order from Lone Pine Publishing, 206, 10426-81 Avenue, Edmonton, Alberta, CANADA T6E 1X5, 800/661-9017. $19.95 plus S/H.)

This highly illustrated and colorful wetland manual is meant for botanists, environmentalists, managers and "all who appreciate, enjoy, study, protect and manage the wetlands" of the Pacific Northwest. It details 155 (mainly flowering) plants, but treats about 330 species in various ways, such as being described as "look-alike" species. It includes native and exotic species. The author uses five identification keys: "pondweeds and others", grasses, rushes, sedges, and willows (*Salix* spp.). In addition to the keys, the plants are arranged in the book according to general habitats, including "submerged and floating, marshy shore, prairie wetland, shrub swamp and wooded wetland" communities.

The color photographs and line drawings of the plants are generally very good. Each plant is described as to growth habit, leaves, flowers, fruits, habitat, natural history, similar species and special notes of interest.

WATER GARDENING -- WATER LILIES AND LOTUSES, by P.D. Slocum, and P. Robinson, with F. Perry. 1996. 434 pp. ISBN 0-88192-335-4
(Order from Timber Press, Inc., 133 SW Second Avenue, Suite 450, Portland, OR 97204-3527, (800/327-5680.) $59.95 plus S/H.)

Written by two of the world's leading water-gardening experts, this very complete book includes two main parts. Part one includes all one needs to know to design, construct and use pools, bogs, waterfalls and streams in the garden landscape. Choosing, planting and maintaining floating, submersed, marginal, and bog plants as well as moisture-loving trees and shrubs, is explained. The roles of fish, frogs, insects and other animals are also described, including particular detail regarding the lives of dragonflies.

Part Two is the "Encyclopedia of Water Lilies and and Lotuses", in which all species and major cultivars of water lilies and lotuses are described, including both day- and night-blooming tropicals. Here are found most of the 445 laser-sharp color photographs of flowers, leaves and roots.

Appendices include hardiness zone maps, a listing of commercial water lily sources, a glossary and a recommended reading list.

[View, from Page 1]

The fauna of paperbark forests is limited. Frogs are usually well-represented by about 8-12 species, and these are preyed upon by the keelback (*Tropidonophis mairii*), a harmless colubrid snake sometimes found in large numbers. Kangaroos and wallabies are largely confined to areas supporting blady grass (*Imperata cylindrica*), or other palatable species. Paperbarks do not develop hollow limbs so they do not provide shelter for possums, gliders, parrots, and other hole-nesting birds. These species will occur where emergent eucalypts are present, but a monotypic stand of paperbarks is very poor habitat for mammals and most birds.

Paperbarks flower prolifically and the blossoms attract large numbers of nectar-feeding birds and bats. The birds include several species of honey eater and lorikeet, and there are four species of temperate nectar-feeding bat, ranging in weight from 15 grams up to a kilogram. When a paperbark forest is in bloom, it becomes very noisy, with squawking birds by day, and squabbling bats by night. Feral and domesticated honeybees take much of the honey and nectar.

Most of the coastal paperbark forests were cleared in the past for pasture. The remaining stands are threatened by real estate development. In Brisbane, Australia's third largest city, the conservation of remaining paperbarks has become a conservation issue. The Brisbane City Council opposed development of one paperbark stand as a shopping centre, and the site has now become a bushland park called Deagon Wetlands.

In a recent book, *Wild Places of Greater Brisbane* (1996), Brisbane City Council Officer Stephen Poole had this to say about Deagon:

"Paperbark forest has the highest loss rate and is under the most threat of any vegetation type in South-East Queensland. This, and its relatively undisturbed nature, make the Deagon Wetlands one of the most important bushland sites within the metropolitan area. The wetlands are administered by Brisbane City Council as a Conservation Reserve, specifically established to protect this fast disappearing habitat."

Paperbarks germinate prolifically and grow quickly, and when given the chance, they soon reclaim cleared swampy ground. The species remains very common on disturbed swampy land despite the broad-scale clearing of the past. It is the habitat type that is under threat, not the species.

Paperbark remnants are very prone to weed invasion. On one side of the Deagen Wetlands, adjacent to housing, a wide range of garden plants is invading the forest, by courtesy of garden dumping. The worst invader is probably groundsel bush (*Baccharis halimifolia*), a declared noxious weed originally introduced from North America as an ornamental. Another weed is broad-leaved pepper tree (*Schinus terebinthifolius*), which forms a tall shrub layer along swampy watercourses. This shrub or small tree is widely grown as an ornamental, and its spread as a weed appears to be relatively recent. I have seen lorikeets eating the fruits and birds are apparently spreading the seeds. Another invasive weed is morning glory (*Ipomoea indica*).

I am aware that Australian insects have been introduced to Florida in a bid to control the spread of melaleuca. I would question whether this is likely to succeed. Melaleucas in Australia are attacked by a very large number of insects yet they still grow naturally in vast monocultures, representing one of the most common trees in the region. In pre-European times it was almost certainly the most common tree along the coastal strip of southern Queensland and northern New South Wales. From the few pictures I have seen, the paperbark forests of Florida look much like the paperbark forests here. However, in Australia, the insect predators are heavily controlled by parasites, and perhaps by birds. For example, the larvae and eggs of the pergid sawfly (*Lophyrotoma zonalis*) which is being studied for possible introduction into Florida, are heavily parasitised in Australia. One can only hope that in Florida, free from their controlling agents in Australia, the insects will be dramatically successful in controlling *Melaleuca*.

America's Least Wanted

Alien Species Invasions of U.S. Ecosystems

This report and video about non-native plants and animals by The Nature Conservancy declares that "an invasion is underway that is undermining our nation's economy and endangering our most precious natural treasures." The organization claims that "just 79 of them have cost the U.S. economy *$97 billion* in direct losses from 1906 to 1991."

The report profiles "the dirty dozen of the least wanted", exotic species that exemplify the range of problems caused by exotic species. Included is information about the species (including range maps), the problems caused by them, and things individuals can do to stop them. The dirty dozen are:

1) **Zebra mussel** - *Dreissena polymorpha*
2) **Purple loosestrife** - *Lythrum salicaria*
3) **Flathead catfish** - *Pylodictis olivaris*
4) **Tamarisk** - *Tamarix* species
5) **Rosy wolfsnail** - *Euglandina rosea*
6) **Leafy spurge** - *Euphorbia esula*
7) **Green crab** - *Carcinus maenas*
8) **Hydrilla** - *Hydrilla verticillata*
9) **Balsam wooly adelgid** - *Adelges piceae*
10) **Miconia** - *Miconia calvescens*
11) **Chinese tallow** - *Sapium sebiferum*
12) **Brown tree snake** - *Boiga irregularis*

The report and video are available from:
The Nature Conservancy
Communications Department
1815 North Lynn Street
Arlington, VA 22209-2003
(703/841-8745)
It is also available at http://www.tnc.org/science/library

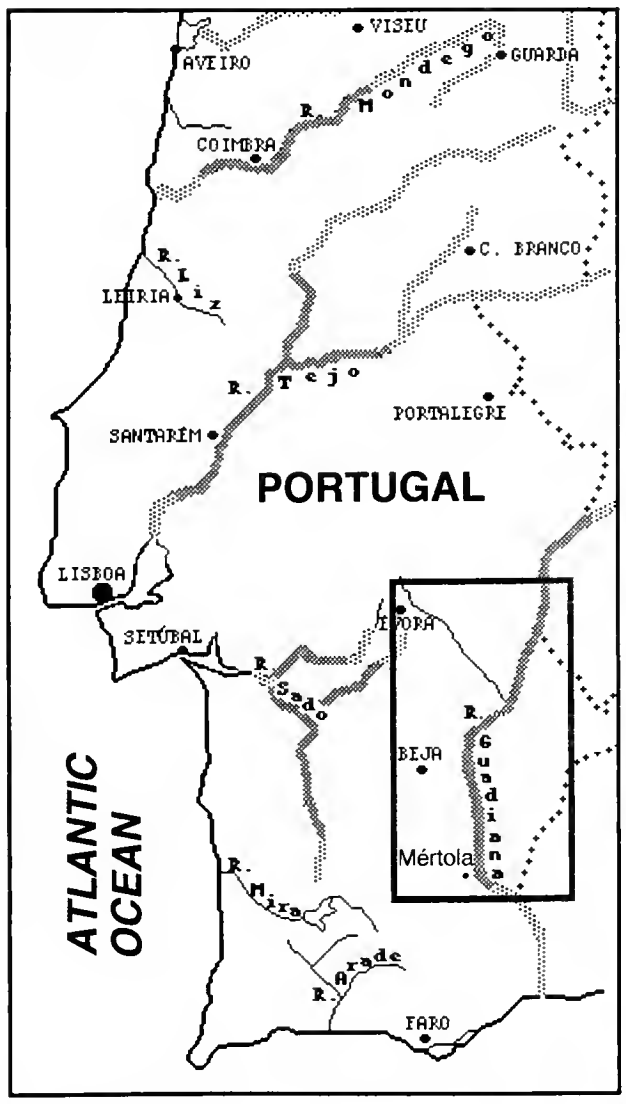
The Uncontrolled Growth of *Azolla* in the Guadiana River

by Francisco Carrapiço*, M.H. Costa, M.L. Costa, G. Teixeira, A.A. Frazao, M.C.R. Santos, M.V. Baioa
*Departamento de Biologia Vegetal, Faculdade de Ciencias da Universidade de Lisboa, Centro de Biologia Ambiental, Lisboa, Portugal
E-mail: F.Carrapico@cc.fc.ul.pt Also, see **The *Azolla* Page** at http://skull.cc.fc.ul.pt/~bfcarrap/Main_Azolla.html

The Guadiana River is an international one that has its spring in Spain (Campo Montiel) and its mouth between Ayamonte and Vila Real de Santo António (Algarve, Portugal). The basin area of the river is about 67,000 km^2, of which 12,000 km^2 are in Portuguese territory. In 1990-1993, southern Portugal experienced low rainfall with long dry seasons. This factor, combined with several dams along the river, caused low water flow during 1993. In addition, farming and industrial activity in the upper area of the Guadiana, together with untreated domestic effluents from several towns and villages, contributed to organic contamination of the Guadiana River that year. Lower flows (3.64 - 1.13 m^3/s) also promoted higher nutrient concentrations. Maximum *Azolla* growth requires a phosphorus level of over 0.4 mg/L. At different river sites during the first months of 1993, the phosphorous levels changed, with maximum concentration values in April between 5.36 and 0.63 mg/L P. In April 1993, a massive *Azolla* fern bloom occurred.

Azolla caroliniana normally exists in small channels or in restricted zones of the upper Guadiana River. In the lower Guadiana River, the bloom was composed of *Azolla filiculoides*. The number of sporulated plants in 1993 was ≥75%. This fact, associated with the high nutrient concentration in the river, allowed the fern to expand into new areas, ending with the explosive bloom observed in 1993. In some areas, *Azolla* covered the surface for several kilometres along the river. The situation was the worst near the village of Mértola and produced panic among the population, especially the fishing community. Fishing was difficult and the fish caught could not be sold due to local suspicion that it was poisoned.

The explosive growth of the *Azolla* represented the first occurrence in Portugal of such a large scale uncontrolled growth of this fern in a river. As a consequence, governmental authorities took a special interest. Aerial photographs of the river were taken to document the extent of the coverage and military forces were brought in to control and isolate the area. The situation grew into a national event with intense media coverage. Unfortunately, some of the news reported was incorrect or exaggerated, contributing to the panic of the population. Decisions by the government to remove the *Azolla* were rash and without scientific support. In the first removal efforts made by the local and military authorities, large amounts of the fern were harvested and placed on the river banks to dry. A large quantity of juvenile eels (*Anguilla anguilla*) were found in the harvested biomass, which was a cause of great concern. Apparently, the *Azolla* bloom had coincided with the migration of juvenile eels in the river. Due to concern that the fern biomas, which covered large areas of the river, could cause eutrophic conditions, a monitoring survey of the main water quality parameters was done and the *Azolla* biomass was removed in the most problematic areas.



Map of the *Azolla* bloom on the Guadiana River in Portugal.

The catastrophic event ended with the closing of the life cycle of *Azolla* and the disappearance of its vegetative structure. However, the incident left an important message for our environmental authorities who need to examine weed management in Portugal. The way a civil population can react to an unusual ecological situation and how the media can contribute to the amplification of the situation, perhaps leading to panic, are important points to be considered for management models developed in the future. All of these events reinforce our belief that only with monitoring and prevention, involving central and local authorities with an adequate environmental education, can we solve future problems like those experienced in April of 1993.


View of the *Azolla filiculoides* "carpet" covering the water surface near Mértola, Portugal.

Getting to Know the Natives

Spin-the-Wheel Bladderworts

by **Kathy Craddock Burks, Botanist**, Technical Services, Bureau of Aquatic Plant Management, Florida Department of Environmental Protection, 3917 Commonwealth Blvd., MS 710, Tallahassee, FL 32399, 904/487-2600.

Aquatic bladderworts (*Utricularia* spp.) are submersed, rootless, carnivorous plants. Their stems, with leaflike branching, may grow to over a meter long, and most bear small "urnlike" bladders that trap and digest tiny animals. These plants also provide habitat for invertebrates and juvenile fish.

Among Florida's 14 species of bladderwort are two that are often confused because of their similar habit. They have distinctive swollen lateral branches ("floats") that radiate from a node of the flowering stalk like spokes of a wheel.

Both ***Utricularia inflata*** and ***U. radiata*** form these easily recognized floating "wheels." Both have yellow flowers, and both have submersed stems below the floats with highly dissected leaflike branching. Of course, both have bladders that are typical of the genus. However, upon closer inspection, one can use several other characteristics to distinguish the two species.

The larger of the two is *U. inflata,* with usually longer, wider floats and a flower scape rising as much as 15 cm above them (compared to a maximum scape length above the floats of 6 cm for *U. radiata).* Also, the floats in *U. inflata* gradually taper in width toward the center of the whorl, while those in *U. radiata* do not, except for a brief, more abrupt tapering near the axis. But admittedly, such morphological features can be difficult to discern when you have only one of the two species at hand.

Clearer distinctions can be found in the inflorescence. The scape of *U. inflata* may bear 4 to 18 flowers, with a usual number of 10 or 11, while *U. radiata* may bear 1 to 7 flowers but most often has 3 or 4. The individual mature fruiting stalks are usually recurved (bent downward) in *U. inflata,* and nearly always erect or ascending in *U. radiata.* The small leaflike bract at the base of individual flower stalks is definitely longer than broad in *U. inflata,* and unlobed; in *U. radiata,* the bract is lobed and broader than long. And not least of all, the protrusion of extra petal tissue seen on the "back" of each flower—i.e., the corolla spur—differs in the two plants: its tip is usually notched in *U. inflata,* and not so in *U. radiata.*

The two species also differ in their mode of vegetative reproduction. When plants of *U. inflata* are stranded on exposed muck or mud, they frequently produce long threadlike branches among the "leafy" stems, with each "thread" bearing a tiny tuber at its tip. *U. radiata* does not produce tubers, but under similar conditions will form tiny vegetative buds at the axils of smaller branches. (Either species may turn up in great numbers following a drought or drawdown event in a shallow waterbody, and then return to relative obscurity in the plant community at higher, stabilized water levels.)

Both of these bladderworts occur in all regions of the state, although *U. inflata* is the more commonly seen species. Its distribution extends on the Coastal Plain from New Jersey and Delaware to south Florida, and west to eastern Texas. The smaller species, *U. radiata,* is more cold-hardy, and ranges north to Nova Scotia, west to Indiana and Arkansas, and south to Florida.

For more information contact the address above.

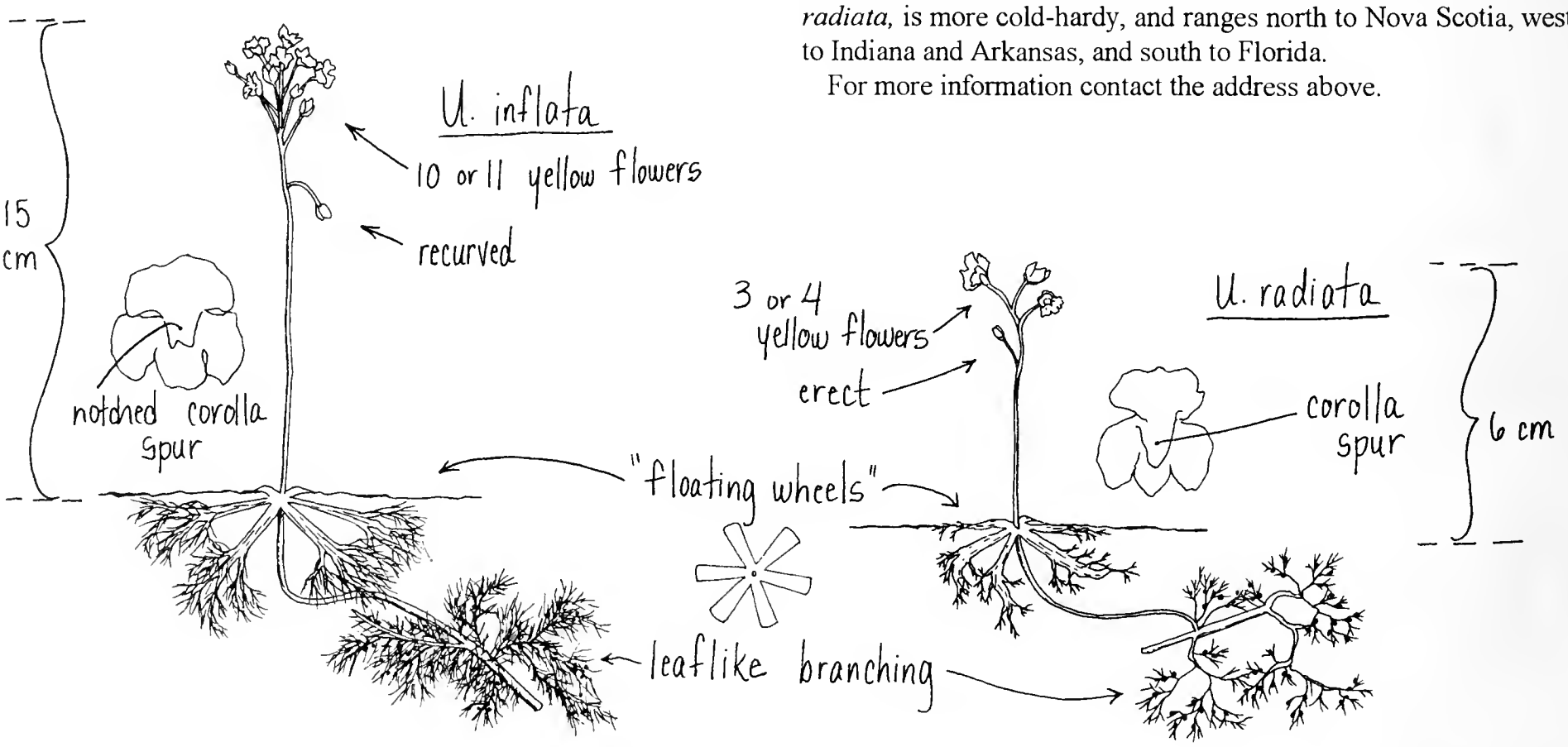


Illustration by Ann Murray, Center for Aquatic Plants, University of Florida

Aquatic Plant Drawings Package for Sale

The very popular APIRS aquatic plant drawings collection is now **for sale**. As of December 1996, there are 114 looseleaf pages of drawings in the collection, which grows monthly. Purchase of the set 1) allows the purchaser to use the drawings, and 2) qualifies the purchaser to receive updates of new drawings for one year from the time of purchase. For more information, contact Vic Ramey at E-mail: varamey@nervm.nerdc.ufl.edu or telephone: 352/392-1799.

1 Freshwater Scenics
2 Illustrated Glossary of plant parts
3 *Alternanthera philoxeroides* - Alligatorweed
4 *Andropogon glomeratus* - Bushy beardgrass
5 *Arundo donax* - Giant reed
6 *Azolla caroliniana* - Azolla
7 *Bacopa caroliniana* - Blue-hyssop
8 *Bidens laevis* - Bur-marigold
9 *Brachiaria mutica*
10 *Brasenia schreberi* - Water shield
11 *Cabomba aquatica* - Fanwort
12 *Carex* spp. - Sedge
13 *Carex comosa* - Sedge
14 *Carex glaucescens* - Sedge
15 *Casuarina* spp. - Australian pine
16 *Cephalanthus occidentalis* - Buttonbush
17 *Ceratophyllum demersum* - Coontail
18 *Chara* spp. - Muskgrass
19 *Cicuta mexicana* - Water hemlock
20 *Cladium jamaicense* - Saw-grass
21 *Colocasia esculenta* - Wild Taro
22 *Colubrina asiatica*
23 *Crassula helmsii* - Swamp stonecrop
24 *Cyperus distinctus* - Flat sedge
25 *Cyperus odoratus* - Flat sedge
26 *Decodon verticillatus* - Swamp loosestrife
27 *Dichromena colorata* - White-top sedge, Star rush
28 *Egeria densa*
29 *Eichhornia crassipes* - Water hyacinth
30 *Eichhornia crassipes* - (2nd drawing)
31 *Eleocharis baldwinii* - Slender spikerush
32 *Eriocaulon decangulare* - Pipewort
33 *Habenaria blephariglottis* - White fringed orchid
34 *Helianthus angustifolius* - Narrow-leaf sunflower
35 *Hydrilla verticillata* - Hydrilla
36 *Hydrilla* comparisons: *Hydrilla-Elodea-Egeria*
37 *Hydrocotyle* spp.
38 *Hygrophila polysperma* - Hygro
39 *Ipomoea aquatica* - Water spinach
40 *Ipomoea fistulosa*
41 *Juncus effusus* - Soft rush
42 *Juncus elliottii* - Bogrush
43 *Lachnanthes caroliniana* - Redroot
44 *Lagarosiphon* spp. - African elodea
45 *Lemna minor** - Duckweed
46 *Liatris spicata* - Blazing star
47 *Lilium catesbaei* - Pine lily
48 *Limnobium spongia* - Frog's bit
49 *Limnocharis flava* - Flowering rush
50 *Limnophila sessiliflora* - Ambulia
51 *Lobelia cardinalis* - Cardinal-flower
52 *Ludwigia alternifolia* - Seed-box, Rattle-box
53 *Ludwigia peruviana* - Primrose-willow
54 *Ludwigia repens* - Red ludwigia
55 *Luziola fluitans* - Watergrass
56 *Lygodium japonicum* - Japanese climbing fern
57 *Lythrum salicaria* - Purple loosestrife
58 *Melaleuca quinquenervia* - Melaleuca
59 *Mimosa pigra* - Giant sensitive plant
60 *Monochoria hastata*
61 *Monochoria vaginalis*
62 *Myriophyllum aquaticum* - Parrot feather
63 *Myriophyllum heterophyllum* - Variable-leaf milfoil
64 *Myriophyllum spicatum* - Eurasian water milfoil
65 *Najas guadalupensis* - Southern naiad
66 *Nechamandra alternifolia*
67 *Nelumbo lutea* - American lotus
68 *Nitella* spp. - Stonewort
69 *Nuphar* spp. - Cow lily, Spatterdock
70 *Nymphaea* spp. - Water lily
71 *Oryza rufipogon* - Wild red rice
72 *Oscillatoria* spp.*
73 *Oxypolis filiformis* - Water dropwort
74 *Panicum hemitomon* - Maidencane
75 *Panicum repens* - Torpedograss
76 *Paspalum urvillei* - Vasey grass
77 *Pennisetum purpureum* - Elephant grass
78 *Phragmites australis* - Common reed
79 *Pistia stratiotes* - Water lettuce
80 *Polygonum densiflorum* - Knotweed
81 *Polygonum hydropiperoides* - Smartweed
82 *Pontederia cordata* - Pickerelweed
83 *Pontederia rotundifolia* - Tropical pickerelweed
84 *Potamogeton illinoensis* - Illinois pondweed
85 *Potamogeton pusillus*
86 *Rhynchospora cephalantha* - Beak rush
87 *Rhynchospora inundata* - Beak rush
88 *Ruellia brittoniana*
89 *Sagittaria lancifolia* - Duck potato
90 *Sagittaria stagnorum*
91 *Salvinia (S. molesta, S. minima, S. auriculata)* - Salvinia
92 *Salvinia rotundifolia (minima)* - Salvinia
93 *Saururus cernuus* - Lizard's-tail
94 *Schinus terebinthifolius* - Brazilian pepper-tree
95 *Scirpus californicus* - Giant bulrush
96 *Solanum tampicense* - Aquatic soda apple
97 *Sparganium americanum* - Bur-reed
98 *Sparganium erectum* - Exotic bur-reed
99 *Spirodela polyrhiza** - Giant duckweed
100 *Spirogyra* spp.*
101 *Stratiotes aloides* - Water soldier, Water aloe
102 *Thalia geniculata* - Fire flag
103 *Trapa* spp. - Water chestnut
104 *Typha (T. domingensis, T. latifolia)* - Cattail
105 *Ulothrix* spp.*
106 *Utricularia purpurea* - Bladderwort
107 *Utricularia radiata* - Bladderwort
108 *Vallisneria americana* - Tapegrass
109 *Viola* spp. - American violet
110 *Vossia cuspidata* - Hippo grass
111 *Wolffia* spp.* - Water-meal
112 *Xyris* spp. - Yellow-eyed grass
113 *Zizania aquatica* - Wild rice
114 *Zizaniopsis miliaceae* - Giant cutgrass

**Lemna, Spirodela, Wolffia* on Lemna page
**Oscillatoria, Spirogyra, Ulothrix* on Spirogyra page

Artists:

Raphael Gottlieb
Jean Putnam Hancock
Laura Line
Ann Murray
Katrina Vitkus

Database of Personnel in Aquatic Plant Research and Management

Please look at the form on page 15. The form has two purposes.

First, as you read from the article on page one, your name has been deleted from the **AQUAPHYTE** mail lists. If you wish to receive future issues of this newsletter, **you *must* re-subscribe in writing**, by mail or E-mail. This form will do. Rip it out, copy it or download it from the APIRS WWW site at: http://aquat1.ifas.ufl.edu/apirsform.html

Second, in conjunction with the Aquatic Plant Management Society, Inc., **APIRS is compiling a database** of people throughout the world who work with aquatic plants, particularly in research and management. This database will be available on-line from our WWW site to provide a referral service which can be searched by country, plant species, field of expertise, etc. This database will be especially useful for anyone seeking assistance with a particular plant or needing contacts in a specific country.

If you would like to be included in this database, please complete and return the form, omitting any information that you do not want included in the database. Return the form or its copy to APIRS, Center for Aquatic Plants, 7922 NW 71 ST, Gainesville, FL 32653, or E-mail its equivalent to: varamey@nervm.nerdc.ufl.edu

****** PRIZE TICKET! ******

Names of all respondents to this questionnaire will be entered into a drawing on 15 July 1997. The winner will receive **a complete set of the *Journal of Aquatic Plant Management*** from 1962 to 1996.

The Aquatic Plant Management Society, Inc.

The Aquatic Plant Management Society, Inc., (APMS) is an international, professional organization of scientists, educators, administrators, and concerned individuals interested in the management and control of aquatic plants. The membership reflects a diverse collection of federal, state, and local agencies; researchers and students from universities and colleges around the world; corporations; commerical plant managers; and others dedicated to promoting research and sharing information about aquatic plants and the technology of aquatic plant management.

Originally named The Hyacinth Control Society, Inc. when formed in 1961, APMS has evolved into a respected source of expertise in the aquatics field. The Society has grown to include several regional or state chapters within the US, and through these affiliates, annual meetings, newsletters, and the ***Journal of Aquatic Plant Management***, members keep abreast of the latest developments in aquatic plant ecology, physiology, and biological, mechanical, chemical, and integrated methods of aquatic plant management.

APMS membership dues: Active = $35.00; Student = $5.00; Subscriptions available.
If you would like further information about how to join this international society, please check the space at the bottom of the form on page 15. (Please do NOT include payment with the form.)

The following is a dual purpose form. Please see the facing page and page one for more information.

Please check one or both:

For AQUAPHYTE Subscription Renewal _____ (free of charge)

For The Database of Personnel in Aquatic Plant Research and Management _____

Return this form or copy to: **APIRS, Center for Aquatic Plants, 7922 NW 71 ST, Gainesville, FL 32653-3071.** *Or the equivalent E-mail to:* **varamey@nervm.nerdc.ufl.edu**

Title and Name:.....

Address:.....

.....

.....

Telephone:..... **Fax**:.....

E-mail:.....

WWW/Internet Site:.....

Your Languages:.....

Fields of Expertise: (please check as many as are appropriate) APM = Aquatic Plant Management.

.....Algae	.....Macrophytes	.....Invertebrates
.....Fisheries	.....Other fauna	.....Limnology
.....Large lakes (> 10 ha)	.....Small lakes and ponds	.....Rivers and streams
.....Canals	.....Wetlands	.....Estuaries
.....Education	.....Researcher	.....Research Technician
.....Student	.....Information/library	.....Aquatic ecology
.....Plant physiology	.....Plant taxonomy	.....Ecosystem studies
.....Photography/illustrations	.....Surveying/mapping methodologies	.....Public health
.....Engineering	.....Aquatic plant production/nursery	.....Aquascaping/mitigation
.....APM regulation/permitting	.....APM equipment production/sales	.....APM program administration
.....APM field supervision	.....APM field operations/Technician	.....APM - Mechanical
.....APM Herbicides	.....APM Biocontrol - fish	.....APM Biocontrol - other vertebrates
.....APM Biocontrol - invertebrates	.....APM Biocontrol - pathogens	.....Aquatic plant utilization

Countries in which you have used your expertise: .....

.....

Plant species with which you are <u>most</u> familiar: .....

.....

Employer: (please check as many as are appropriate)

.....International agency	.....National government	.....State government	.....Local government
.....Private business	.....Research institution	.....Educational institution	.....Regulatory agency
.....Direct APM services	.....Consultants	.....Equipment/Herbicide Mfg.	.....Retired

If you would like further information about how to join the Aquatic Plant Management Society, please check here: _____

The Electronic Media Page

CD -- Zebra Mussel Information System--ZMIS

A single CD for Microsoft Windows, produced by the U.S. Army Corps of Engineers

This is truly an all-in-one information source about the new scourge of U.S. dams and other water control operations, recreational areas and ecological zones: zebra mussels and quagga mussels. In this CD, you'll find well-organized and easy-to-use interfaces to: larval and adult identification of zebra and quagga mussels, including many pictures; complete hot-linked text; impacts on industry, recreation and ecosystems; life history diagrams and text; comparisons to several other species of mussels; distribution maps over time; risk assessment software; detection and monitoring systems; management and control options; case studies; molluscicide issues; hundreds of references according to topic; a separate picture list... The creators of this CD knew what they were doing. It works.

The authors of this CD are working on two more: Aquatic Plant Information System (APIS), ID information on 60 aquatic plants, including biocontrol information on 18 of them; and the Noxious and Nuisance Plant Management Information System (PMIS), ID and control information on 34 terrestrial and aquatic weeds. Both are due for release in 1997.

Order from Dr. Michael Grodowitz, CEWES-ER-A, 3909 Halls Ferry Road, Vicksburg, MS 39180; (601/634-2972) (E-mail: GrodowM@exl.wes.army.mil)

CD -- Aquatic Plants Field Identification Guide

A single CD or multiple diskettes for Microsoft Windows, produced by the Texas Agricultural Extension Service

Sixty-eight plants are indexed and depicted in this CD. Each plant treatment includes a photograph and a sometimes too-brief description, plus a line drawing. The plants are indexed by common name, or may be searched by category: floating, algae, emersed, shoreline/marginal or submersed.

Order from Prof. James Davis, Extension Specialist, 102 Nagle Hall, College Station, TX 77843-2258; (409/845-7473) (E-mail: jdavis21@tamu.edu)

CD -- Weeds of the United States

A single CD for Microsoft Windows, produced for the Southern Weed Science Society by Information Design

"This CD contains almost 1600 color photographs, detailed descriptions and distribution maps of 300 weeds of the continental United States. The program also includes illustrated lessons and quizzes on the principles of plant identification and an illustrated glossary of botanical terms that is hot-linked to the lessons and weed descriptions." This CD does not feature an identification key; you simply must know the name of the plant you want information about. This product does feature a unique and thorough collection of photographs of seeds and seedlings of weeds, which farmers presumably would come across first in well-maintained fields, but there is a noticeable dearth of photos of mature weeds in their habitats, nor does the CD include drawings of these plants.

If this CD, with its good-looking interface to plant identification information and its intensive hyper-linking, could be combined with **Plant-ID**, the computerized "key" (described below) that enables users to sort 2,000 weed species by their characteristics but has no pictures or other information, then you'd *really* have a weed CD!

Order from Southern Weed Science Society, 1508 West University Avenue, Champaign, IL 61821-3133; (217/353-4212). $90.00.

Floppy -- Plant-ID: Weeds and Toxic Plants of U.S. and Canada

A single 3.5" floppy disk, that runs in DOS on a PC, produced by the University of Idaho

This computer program acts as a key to aid the user in identifying more than 2,000 species of weeds growing in fields, lawns and gardens of North America. By selecting a few of more than 50 possible characteristics for "non-grass-like" plants, or more than 40 characteristics for "grass-like" plants, the user automatically takes advantage of the computer's ability to combine and re-combine, thus making it more likely for a non-botanist to identify a plant. The program includes a good manual that depicts the possible characteristics. What the program does not include are plant descriptions, pictures, graphics and drawings --users are expected to refer to other media for these.

Order from Weed Diagnostic Lab, Department of PSES, University of Idaho, Moscow, ID 83844-2339; (208/885-7831). $99.95.

Video -- Restoring the Balance: Biological Control of Purple Loosestrife

A 28-minute video produced by Cornell University

This video is a primer about the exotic nuisance marsh plant, purple loosestrife (*Lythrum salicaria*), its impacts on North American wetlands, previous attempts since the 1970s to control its spread and infestations, and the new emphasis on identifying and introducing biological controls to help manage it. The video includes details on several weevils and other insects being studied as biocontrol agents, and includes footage showing how to augment and enhance field populations of the insects. This video is very instructive for viewers interested in biological control of any aquatic plants, whether loosestrife or hydrilla. The only problem is, there is no conclusion: it will be "several years" before the scientists and video makers will know whether the released insects have any effect on the target plant.

Order from Cornell University, Media Services Center, 7 Cornell Business & Technology Park, Ithaca, NY 14850; (607/255-2090). $24.95 plus S/H.

FROM THE DATABASE

Here is a sampling of the research articles, books and reports which have been entered into the aquatic plant database since April 1996.

The database has more than 43,000 citations. To receive free bibliographies on specific plants and/or subjects, contact APIRS or use the database online at http://aquat1.ifas.ufl.edu/

To obtain articles, contact your nearest state or university library.

Agren, J.; Ericson, L.
Population structure and morph-specific fitness differences in tristylous *Lythrum salicaria*.
EVOLUTION 50(1):126-139. 1996.

Aldridge, F.J.; Phlips, E.J.; Schelske, C.L.
The use of nutrient enrichment bioassays to test for spatial and temporal distribution of limiting factors affecting phytoplankton dynamics in Lake Okeechobee, Florida.
HYDROBIOL. SPEC. ISSUES ADVANC. LIMNOL. 45:177-190. 1995.

Anderson, L.; Fellows, S.; Pirosko, C.
Effect of Garlon 3A on waterhyacinth (*Eichhornia crassipes*) in a pond on the Los Banos Wildlife Refuge.
IN: AQUATIC WEED CONTROL INVESTIGATIONS, ANNUAL REPORT, L.W.J. ANDERSON, ED., USDA AGRIC. RES. SERV., UNIV. CALIFORNIA, DAVIS, 31 PP. 1994.

Barrat-Segretain, M.H.; Amoros, C.
Influence of flood timing on the recovery of macrophytes in a former river channel.
HYDROBIOLOGIA 316(2):91-101. 1995.

Barreto, R.W.; Evans, H.C.
The mycobiota of the weed *Mikania micrantha* in southern Brazil with particular reference to fungal pathogens for biological control.
MYCOL. RES. 99(3):343-352. 1995.

Bellan-Santini, D.; Arnaud, P.M.; Bellan, G.; Verlaque, M.
The influence of the introduced tropical alga *Caulerpa taxifolia* on the biodiversity of the Mediterranean marine biota.
J. MAR. BIOL. ASSOC. U.K. 76(1):235-237. 1996.

Bjorndal, K.A.; Bolten, A.B.
Digestive efficiencies in herbivorous and omnivorous freshwater turtles on plant diets: do herbivores have a nutritional advantage?
PHYSIOL. ZOOL. 66(3):384-395. 1993.

Bramwell, S.A.; Prasadd, P.V.D.
Performance of a small aquatic plant wastewater treatment system under Caribbean conditions.
J. ENVIRON. MANAGE. 43(3):213-220. 1995.

Braverman, M.P.
Weed control in rice (*Oryza sativa*) with Quinclorac and bensulfuron coating of granular herbicides and fertilizer.
WEED TECHNOL. 9(3):494-498. 1995.

Bryson, C.T.; Carter, R.
Notes on *Carex, Cyperus*, and *Kyllinga* (Cyperaceae) in Mississippi with records of eight species previously unreported to the state.
SIDA 16(1):171-182. 1994.

Buckingham, G.R.
Biological control of aquatic weeds.
IN: PEST MANAGEMENT IN THE SUBTROPICS: BIOLOGICAL CONTROL - A FLORIDA PERSPECTIVE, D. ROSEN, F.D. BENNETT, J.L. CAPINERA, EDS., LAVOISIER PUBL., SECAUCUS, NY, PP. 413-480. 1994.

Camargo, A.F.M.; Esteves, F.A.
Influence of water level variation on biomass and chemical composition of the aquatic macrophyte *Eichhornia azurea* (Kunth) in an oxbow lake of the Rio Mogi-Guacu (Sao Paulo, Brazil).
ARCH. HYDROBIOL. 135(3):423-432. 1996.

Collares-Pereira, M.J.; Magalhaes, M.F.; Geraldes, A.M.; Coelho, M.M.
Riparian ecotones and spatial variation of fish assemblages in Portuguese lowland streams.
IN: THE IMPORTANCE OF AQUATIC-TERRESTRIAL ECOTONES FOR FRESHWATER FISH, F. SCHIEMER, M. ZALEWSKI, J.E. THORPE, EDS., KLUWER ACADEMIC PUBL., DORDRECHT, THE NETHERLANDS, HYDROBIOLOGIA 303: 93-101. 1995.

Cruzan, M.B.; Barrett, S.C.H.
Postpollination mechanisms influencing mating patterns and fecundity: an example from *Eichhornia paniculata*.
BULL. TORREY BOTANICAL CLUB 123(1):1-6. 1996.

David, P.G.
Changes in plant communities relative to hydrologic conditions in the Florida Everglades.
WETLANDS 16(1):15-23. 1996.

De Casabianca, M.L.
Large-scale production of *Eichhornia crassipes* on paper industry effluent.
BIORESOURCE TECHN. 54(1):35-38. 1995.

De Leeuw, J.; Wielemaker, A.; De Munck, W.; Herman, P.M.J.
Net aerial primary production (NAPP) of the marsh macrophyte *Scirpus maritimus* estimated by a combination of destructive and non-destructive sampling methods.
VEGETATIO 123(1):101-108. 1996.

Dong, X-J.; Takagi, S.; Nagai, R.
Regulation of the orientation movement of chloroplasts in epidermal cells of *Vallisneria*: cooperation of phytochrome with photosynthetic pigment under low-fluence-rate light.
PLANTA 197(2):257-263. 1995.

Dooris, P.M.
Hydrilla verticillata: chemical factors in lakes affecting growth.
PH.D. DISSERTATION, DEPT. BIOLOGY, UNIV. SOUTH FLORIDA, TAMPA, 177 PP. 1978.

Eberle, J.R.; Banks, J.A.
Genetic interactions among sex-determining genes in the fern *Ceratopteris richardii*.
GENETICS 142(3):973-985. 1996.

Ferreira, M.T.; Moreira, I.S.
The invasive component of a river flora under the influence of Mediterranean agricultural systems.
IN: PLANT INVASIONS - GENERAL ASPECTS AND SPECIAL PROBLEMS, P. PYSEK, K. PRACH, M. REJMANEK, M. WADE, EDS., SPB ACADEMIC PUBL., AMSTERDAM, THE NETHERLANDS, PP. 117-127. 1995.

Flamm, R.O.; Ward, L.; Weigle, B.L.
Habitat influences on the distribution and abundance of Florida manatee in the Indian River Lagoon, Florida.
ELEVENTH BIENNIAL CONF. BOLOGY OF MARINE MAMMALS, ORLANDO, FL, 14-18 DEC. 1995, P. 14 (ABSTRACT). 1995.

Frantz, V.
Recovery plan for rough-leaved loosestrife (*Lysimachia asperulaefolia*).
U.S. FISH AND WILDLIFE SERV., ATLANTA, GA, 42 PP. 1995.

Freese, G.
Structural refuges in two stem-boring weevils on *Rumex crispus*.
ECOL. ENTOMOL. 20(4):351-358. 1995.

Gabor, T.S.; Haagsma, T.; Murkin, H.R.; Armson, E.
Effects of triclopyr amine on purple loosestrife and non-target wetland plants in south-eastern Ontario, Canada.
J. AQUAT. PLANT MANAGE. 33:48-51. 1995.

Getsinger, K.D.; Madsen, J.D.; Netherland, M.D.; Turner, E.G.
Field evaluation of triclopyr (Garlon 3A) for controlling Eurasian watermilfoil in the Pend Oreille River, Washington.
TECHN. REPT. A-96-1, AQUATIC PLANT CONTROL RES. PROG., US ARMY CORPS ENGR., WATERWAYS EXPER. STATION, VICKSBURG, MS, 72 PP. 1996.

Gordeev, M.I.; Sibataev, A.K.
Influence of predatory plant bladderwort (*Utricularia vulgaris*) on the process of selection in malaria mosquito larvae.
RUSSIAN J. ECOL. 26(3):216-220. 1995.

Grall, G.
Cuatro Cienegas: Mexico's desert aquarium.
NATIONAL GEOGRAPHIC 188(4):85-96. 1995.

Grice, A.M.; Loneragan, N.R.; Dennison, W.C.
Light intensity and the interactions between physiology, morphology and stable isotope ratios in five species of seagrass.
J. EXP. MAR. BIOL. ECOL. 195(1):91-110. 1996.

Hall, J.A.; Cox, N.
Nutrient concentrations as predictors of nuisance *Hydrodictyon reticulatum* populations in New Zealand.
J. AQUAT. PLANT MANAGE. 33:68-74. 1995.

Hara, T.; Srutek, M.
Shoot growth and mortality patterns of *Urtica dioica*, a clonal forb.
ANNALS BOTANY 76(3):235-243. 1995.

Haraguchi, A.
Rhizome growth of *Menyanthes trifoliata* L. in a population on a floating peat mat in Mizorogaike Pond, Central Japan.
AQUATIC BOTANY 53(3,4):163-173. 1996.

Hart, K.H.; Cox, P.A.
Dispersal ecology of *Nuphar luteum* (L.) Sibthorp & Smith: abiotic seed dispersal mechanisms.
BOTANICAL J. LINNEAN SOC. 119(1):87-100. 1995.

Heard, T.A.; Forno, I.W.
Host selection and host range of the flower-feeding weevil, *Coelocephalapion pigrae*, a potential biological control agent of *Mimosa pigra*.
BIOLOGICAL CONTROL 6(1):83-95. 1996.

Hemminga, M.A.; Huiskes, A.H.L.; Steegstra, M.; Van Soelen, J.
Assessment of allocation and biomass production in a natural stand of the salt marsh plant *Spartina anglica* using 13C.
MAR. ECOL. PROG. SER. 130(1-3):169-178. 1996.

Henry, C.P.; Amoros, C.; Bornette, G.
Species traits and recolonization processes after flood disturbances in riverine macrophytes.
BEGETATIO 122(1):13-27. 1996.

Hine, N.R.; Pilidis, G.A.
An assessment of the efficiency of a macrophyte-based biological treatment plant to treat wastewater from a wood impregnation factory.
FRESENIUS ENVIR. BULL. 4(10):630-635. 1995.

Hu, F.S.; Brubaker, L.B.; Anderson, P.M.
A 12,000 year record of vegetation change and soil development from Wien Lake, central Alaska.
CAN. J. BOT. 71(9):1133-1142. 1993.

Idestam-Almquist, J.; Kautsky, L.
Plastic responses in morphology of *Potamogeton pectinatus* L. to sediment and above-sediment conditions at two sites in the northern Baltic proper.
AQUATIC BOTANY 52(3):205-216. 1995.

Jamil, K.; Hussain, S.; Anees, I.; Murthy, U.S.
Toxic effects of lead on the biochemical parameters of the hyacinth weevils *Neochetina eichhornae* through the trophic levels of food chain.
J. ENVIRON. SCI. HEALTH A30(9):1925-1934. 1995.

Jacobsen, N.
The narrow leaved *Cryptocoryne* of mainland Asia.
AQUATIC GARDENER 8(3):71-86. 1995.

Kane, M.
Wetland plant micropropagation: issues and opportunities.
AQUATICS 18(2):4,6,8-11. 1996.

Kilbride, K.M.; Paveglio, F.L.; Grue, C.E.
Control of smooth cordgrass with Rodeo in a southwestern Washington estuary.
WILDLIFE SOC. BULL. 23(3):520-524. 1995.

Kimber A.
Decline and restoration of *Vallisneria americana* in the upper Mississippi River.
DISSERTATION ABSTR. INTERNAT. 55(4):1254-B (ABSTRACT). 1994.

Langangen, A.
Chara-lakes in the county of Troms.
POLARFLOKKEN 19(2):111-118. 1995.

Linz, G.M.; Blixt, D.C.; Bergman, D.L.; Bleier, W.J.
Responses of red-winged blackbirds, yellow-headed blackbirds and marsh wrens to glyphosate-induced alterations in cattail density.
J. FIELD ORNITHOL. 67(1):167-176. 1996.

Lockhart, C.S.
Aquatic heterophylly as a survival strategy in *Melaleuca quinquenervia* (Myrtaceae).
CAN. J. BOT. 74(2):243-246. 1996.

Lorenzoni, C.; Paradis, G.
Synecological observations about the Corsican stations of a rare species, *Cressa cretica* (Convolvulaceae).
BULL. DE LA SOC. BOTANIQUE DU CENTRE-OUEST, NOUVELLE SERIE 25:3-24. 1994.

McBride, T.P.; Noller, B.N.
Sampling techniques for reliable determination of trace metals in macrophytes and periphyton.
MARINE FRESHWATER RES. 46(7):1047-1053. 1995.

McInnch, S.M.; Garbisch, E.W.
The establishment of *Peltandra virginica* from large and small bulbs as a function of water depth.
WETLAND J. 7(1):17-20. 1995.

Middleton, B.A.
Seed banks and species richness potential of coal slurry ponds reclaimed as wetlands.
RESTORATION ECOL. 3(4):311-318. 1995.

Mitchell, S.F.; Wass, R.T.
Food consumption and faecal deposition of plant nutrients by black swans (*Cygnus atratus* Latham) in a shallow New Zealand lake.
HYDROBIOLOGIA 306(3):189-197. 1995.

Moldovan, M.
Large-scale restoration of wetland habitats: the reflooding of the 22 Km^2 Babina Polder in the Danube Delta, Romania.
IN: RESTORATION OF STREAM ECOSYSTEMS - AN INTEGRATED CATCHMENT APPROACH, IWRB PUBL. 37, M. EISELTOVA, J. BRIGGS, EDS., INTERNAT. WATERFOWL AND WETLANDS RES. BUREAU, SLIMBRIDGE, UK, PP. 154-156. 1995.

Murdock, N.A.
Rare and endangered plants and animals of southern Appalachian wetlands.
WATER AIR SOIL POLLUTION 77(3-4):385-405. 1994.

Netherland, M.D.; Getsinger, K.D.
Laboratory evaluation of threshold fluridone concentrations under static conditions for controlling hydrilla and Eurasian watermilfoil.
J. AQUAT. PLANT. MANAGE. 33:33-36. 1995.

Newell, S.Y.; Moran, M.A.; Wicks, R.; Hodson, R.E.
Productivities of microbial decomposers during early stages of decomposition of leaves of a freshwater sedge.
FRESHWATER BIOL. 34(1):135-148. 1995.

Newman, R.M.; Holmberg, K.L.; Biesboer, D.D.; Penner, B.G.
Effects of a potential biocontrol agent, *Euhrychiopsis lecontei*, on Eurasian watermilfoil in experimental tanks.
AQUATIC BOTANY 53(3,4):131-150. 1996.

Parker, M.L.; Waldron, K.W.
Texture of Chinese water chestnut: involvement of cell wall phenolics.
J. SCI. FOOD AGRIC. 68(3):337-346. 1995.

Peckol, P.; Rivers, J.S.
Physiological responses of the opportunistic macroalgae *Cladophora vagabunda* (L.) van den Hoek and *Gracilaria tikvahiae* (McLachlan) to environmental disturbances associated with eutrophication.
J. EXP. MAR. BIOL. ECOL. 190(1):1-16. 1995.

Poovey, A.G.; Kay, S.H.
Effects of short-term summer drawdown on monoecious *Hydrilla* and non-target aquatic plants.
35TH ANN. MEETING, AQUATIC PLANT MANAGE. SOC., JULY 9-12, 1995, BELLEVUE, WA, P. 9 (ABSTRACT). 1995.

Preen, A.
Impacts of dugong foraging on seagrass habitats: observational and experimental evidence for cultivation grazing.
MAR. ECOL. PROG. SER. 124(1-3):201-213. 1995.

Pysek, P.; Pysek, A.
Invasion by *Heracleum mantegazzianum* in different habitats in the Czech Republic.
J. VEGETATION SCI. 6(5):711-718. 1995.

Randall, K.A.
Care and propagation of *Anubias*.
AQUATIC GARDENER 9(3):71-76. 1996.

Ravindran, V.; Sivakanesan, R.; Cyril, H.W.
Nutritive value of raw and processed Colocasia (*Colocasia esculenta*) corm meal for poultry.
ANIMAL FEED SCI. TECHNOL. 57(4):335-345. 1996.

Roberts, J.; Chick, A.; Oswald, L.; Thompson, P.
Effect of carp, *Cyprinus carpio* L., an exotic benthivorous fish, on aquatic plants and water quality in experimental ponds.
MAR. FRESHWATER RES. 46:1171-1180. 1995.

Ryan, F.J.
Nitrogen and carbon concentrations, soluble proteins and free amino acids in subterranean turions of *Hydrilla* during overwintering.
J. AQUAT. PLANT MANAGE. 32:67-70. 1994.

Shearer, J.F.
Field and laboratory studies of the fungus *Mycoleptodiscus terrestris* as a potential agent for management of the submersed aquatic macrophyte *Hydrilla verticillata*.
TECHN. REPT. A-96-3, AQUATIC PLANT CONTROL RES. PROG., US ARMY CORPS ENGR., WATERWAYS EXPER. STATION, VICKSBURG, MS, 30 PP. 1996.

Shilling, D.G.; Gaffney, J.F.
Cogongrass control requires integrated approach (Florida).
RESTORATION MANAGE.NOTES 13(2):227. 1995.

Sinden-Hempstead, M.; Killingbeck, K.T.
Influences of water depth and substrate nitrogen on leaf surface area and maximum bed extension in *Nymphaea odorata*.
AQUATIC BOTANY 53(3,4):151-162. 1996.

Skinner, L.C.; Rendall, W.J.; Fuge, E.L.
Minnesota's purple loosestrife program: history, findings and management recommendations.
SPEC. PUBL. 145, MINN. DEPT. NATURAL RESOURCES, DIV. FISH & WILDL., ECOL. SERV. SECTION, ST. PAUL, MN, 27 PP. 1994.

Stewart, R.M.; Boyd, W.A.
Amur/stock simulations for examination of the effects of site conditions on plant control by grass carp.
34TH ANN. MEETING, AQUATIC PLANT MANAGE. SOC. AND 6TH ANN. MEETING TEXAS AQUATIC PLANT MANAGE. SOC., JULY 10-13, 1994, SAN ANTONIO, TX, P. 16 (ABSTRACT).

Stoner, A.W.; Lin, J.; Hanisak, M.D.
Relationships between seagrass bed characteristics and juvenile queen conch (*Strombus gigas* Linne) abundance in the Bahamas.
J. SHELLFISH RES. 14(2):315-323. 1995.

Thomas, J.D.
The snail hosts of schistosomiasis: some evolutionary and ecological perspectives in relation to control.
MEM. INST. OSWALDO CRUZ 90(2):195-204. 1995.

Thomas, K.L.; Benstead, J.; Davies, K.L.; Lloyd, D.
Role of wetland plants in the diurnal control of CH_4 and CO_2 fluxes in peat.
SOIL BIOL. BIOCHEM. 28(1):17-23. 1996.

Toner, M.; Stow, N.; Keddy, C.J.
Arrow arum, *Peltandra virginica*: a nationally rare plant in the Ottawa Valley region of Ontario.
CAN. FIELD-NATURALIST 109(4):441-442. 1995.

Uchino, A.; Samejima, M.; Ishii, R.; Ueno, O.
Photosynthetic carbon metabolism in an amphibious sedge, *Eleocharis baldwinii* (Torr.) Chapman: modified expression of C4 characteristics under submerged aquatic conditions.
PLANT CELL PHYSIOL. 36(2):229-238. 1995.

Vickery, J.A.; Sutherland, W.J.; Watkinson, A.R.; Lane, S.J.; et al
Habitat switching by dark-bellied brent geese *Branta b. bernicla* (L.) in relation to food depletion.
OECOLOGIA 103(4):499-508. 1995.

Visser, E.J.W.; Bogemann, G.M.; Blom, C.W.P.M.; Voesenek, L.A.C.J.
Ethylene accumulation in waterlogged *Rumex* plants promotes formation of adventitious roots.
J. EXP. BOTANY 47(296):403-410. 1996.

Institute of Food and Agricultural Sciences
AQUATIC PLANT INFORMATION
RETRIEVAL SYSTEM (APIRS)
Center for Aquatic Plants
University of Florida
7922 N.W. 71st Street
Gainesville, Florida 32653-3071 USA
(352) 392-1799
varamey@nervm.nerdc.ufl.edu

NONPROFIT ORG.
U.S. POSTAGE PAID
GAINESVILLE, FL
PERMIT NO. 540

Address Correction Requested

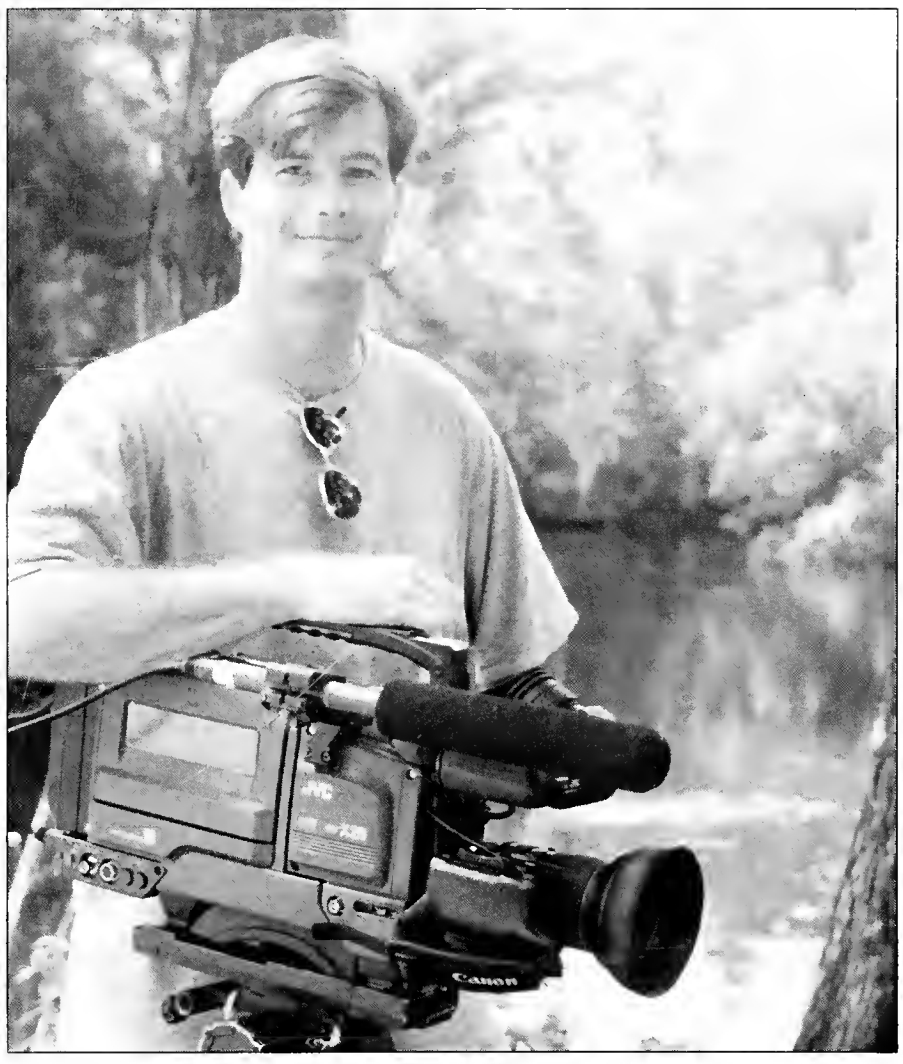
AQUAPHYTE

This is the newsletter of the Center for Aquatic Plants and the Aquatic Plant Information Retrieval System (APIRS) of the University of Florida Institute of Food and Agricultural Sciences (IFAS). Support for the information system is provided by the Florida Department of Environmental Protection, the U.S. Army Corps of Engineers Waterways Experiment Station Aquatic Plant Control Research Program (APCRP), the St. Johns River Water Management District and UF/IFAS.

EDITORS: Victor Ramey
Karen Brown

AQUAPHYTE is sent to more than 6,500 managers, researchers and agencies in 87 countries. Comments, announcements, news items and other information relevant to aquatic plant research are solicited.

Inclusion in **AQUAPHYTE** does not constitute endorsement, nor does exclusion represent criticism, of any item, organization, individual, or institution by the University of Florida.



Randy Miller, Videographer Extraordinaire

HAVE CAMERA -WILL TRAVEL

The APIRS office has made some thirty video programs about aquatic plants and the management of aquatic and wetland ecosystems. If you have anything to do with the study and management of freshwater ecosystems, you likely have seen some of our videos: plant ID; aquatic plant management; lake eutrophication; environmental careers...

We now stand ready to make more.

If you have ideas for video programs that should be made about freshwater environments, **and have the necessary funding to act**, consider contacting the Information Office of the Center for Aquatic Plants of the University of Florida. If you have the necessary funding to act but have no ready ideas, again, please consider contacting the Information Office of the Center for Aquatic Plants of the University of Florida. We have a list of video ideas and treatments about the functioning and management of aquatic and wetland ecosystems, for audiences ranging from middle-school children to lakeside homeowners to environmental management personnel.

Call Vic Ramey, Information Office, Center for Aquatic Plants, 7922 NW 71 ST, Gainesville, FL 32653-3071. Phone: 352/392-1799; E-mail: varamey@nervm.nerdc.ufl.edu; WWW: http://aquat1.ifas.ufl.edu/